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PHYCOLOGIA AUSTRALICA;

OR,

A History of Australian Seaweeds;

COMPRISING

COLOURED FIGURES AND DESCRIPTIONS

OF THE MORE CHARACTERISTIC

MARINE ALGÆ OF NEW SOUTH WALES, VICTORIA, TASMANIA,
SOUTH AUSTRALIA, AND WESTERN AUSTRALIA,

AND

A SYNOPSIS OF ALL KNOWN AUSTRALIAN ALGÆ.

VOL. II.,

CONTAINING PLATES LXI.-CXX.

BY

WILLIAM HENRY HARVEY, M.D., F.R.S.,

MEMBER OF THE ROYAL IRISH ACADEMY, FELLOW OF THE LINNÆAN SOCIETY, COR. MEM. OF THE
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TO

GEORGE BENNETT, ESQ., M.D., F.L.S.,

ETC. ETC.,

OF SYDNEY,

WHO, DURING A LENGTHENED PROFESSIONAL RESIDENCE IN NEW SOUTH WALES,

HAS CONTRIBUTED LARGELY TO OUR KNOWLEDGE OF THE

NATURAL HISTORY OF AUSTRALIA,

AND

WHOSE NOBLE LIBRARY OF WORKS OF REFERENCE IS LIBERALLY

OPENED TO THE USE OF STUDENTS,

The Second Volume of the 'Phycologia Australica'

IS AFFECTIONATELY INSCRIBED BY

THE AUTHOR.

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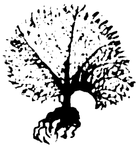

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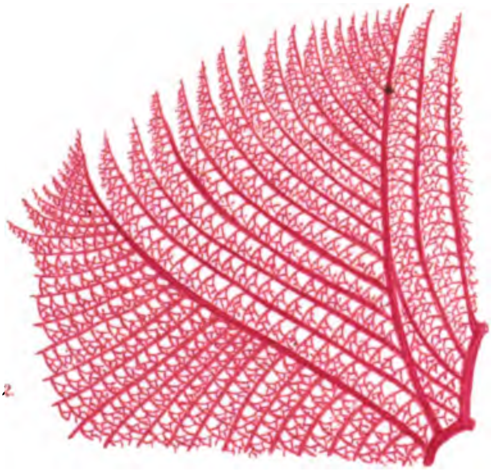

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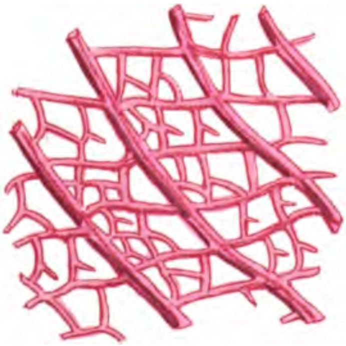


3.

Vincent Brooks, Imp.

PLATE LXI.

CLAUDEA BENNETTIANA, *Harv.*

GEN. CHAR. *Frond* stipitate; stipes filiform, merging in the marginal rib of a flat, unilateral, open network, formed of several series of anastomosing, slender leaflets. *Fructification:* 1, *ceramidia* containing within a membranaceous pericarp a tuft of pear-shaped spores; 2, *stichidia* formed from the bars of the network, and studded with triangularly parted tetraspores in transverse rows.—CLAUDEA (*Lamour.*), in honour of Claude Lamouroux, father of the botanist of that name.

Frons stipite donata. Stipes filiformis, mox in costam marginalem reticuli plani fenestrati, ex foliolis minutis pluriseriatim-secundis uninerviis anastomosantibus formati, abiens. Fruct.: 1, *ceramidia;* 2, *stichidia inter trabeculas reticuli seriata, tetrasporas triangule divisas transversim ordinatas foventia.*

CLAUDEA *Bennettiana;* frond stipitate, shortly acinaciform, lobato-dentate, oblique, unilateral, with a short recurved marginal rib, and numerous secondary ribs digitately radiating from the primary, and dividing the network into cuneate areas; primary leaflets of each area parallel, the secondary and tertiary decussately anastomosing, repeatedly divided; meshes of the net acutangular.

C. Bennettiana; *fronde (unciali) stipitata breviter acinaciformi lobulato-dentata obliqua unilaterali costa brevi marginali costulisque pluribus a costa digitatim radiantibus instructa, reticulum in areas cuneatas designantibus; foliolis primariis parallelis, secundariis decussatim anastomosantibus repetite divisis; angulis omnibus acutis.*

HAB. Once dredged in the Paramatta river, near the east end of Spectacle Island, Port Jackson, *W. H. H., and W. Sheridan Wall,* 1855.

GEOGR. DISTR. New South Wales.

DESCR. *Root* branching. *Frond,* in the only specimen seen, about an inch in length, and rather less in breadth, on a stipes less than ¼ inch long, erect, consisting of a single shortly scimitar-shaped network, formed by the anastomosing of several (5–6) series of secund, filiform leaflets. The *primary* leaflet, forming the costa of the network, is recurved, rather more than ½ inch long; from its upper or convex side spring about ten (but in a full-grown network they would be more numerous) *secondary* costæ (*costulæ*), which diverge in an imperfectly digitate manner from the primary, and traverse the breadth of the net, dividing it into cuneiform spaces whose outer margin is deeply toothed and slightly arched in outline: in older leaves each cuneate space would probably become a shallow lobe. The form of the full-grown frond would probably be between scimitar- and fan-shaped. Returning to the diverging *costulæ:* each costula emits from its lower surface, at an acute

angle, numerous parallel filiform leaflets, which continue to the margin, and end each in the top of one of the marginal teeth; these are connected by subparallel cross bars, which are again irregularly connected by one, two, or three series of lesser bars; and the net is then completed. The *meshes* are of irregular shape, and acutely angled. The *colour* is a full-lake. The *substance* is membranaceous, and the frond adheres closely to paper in drying. No *fructification* has been seen.

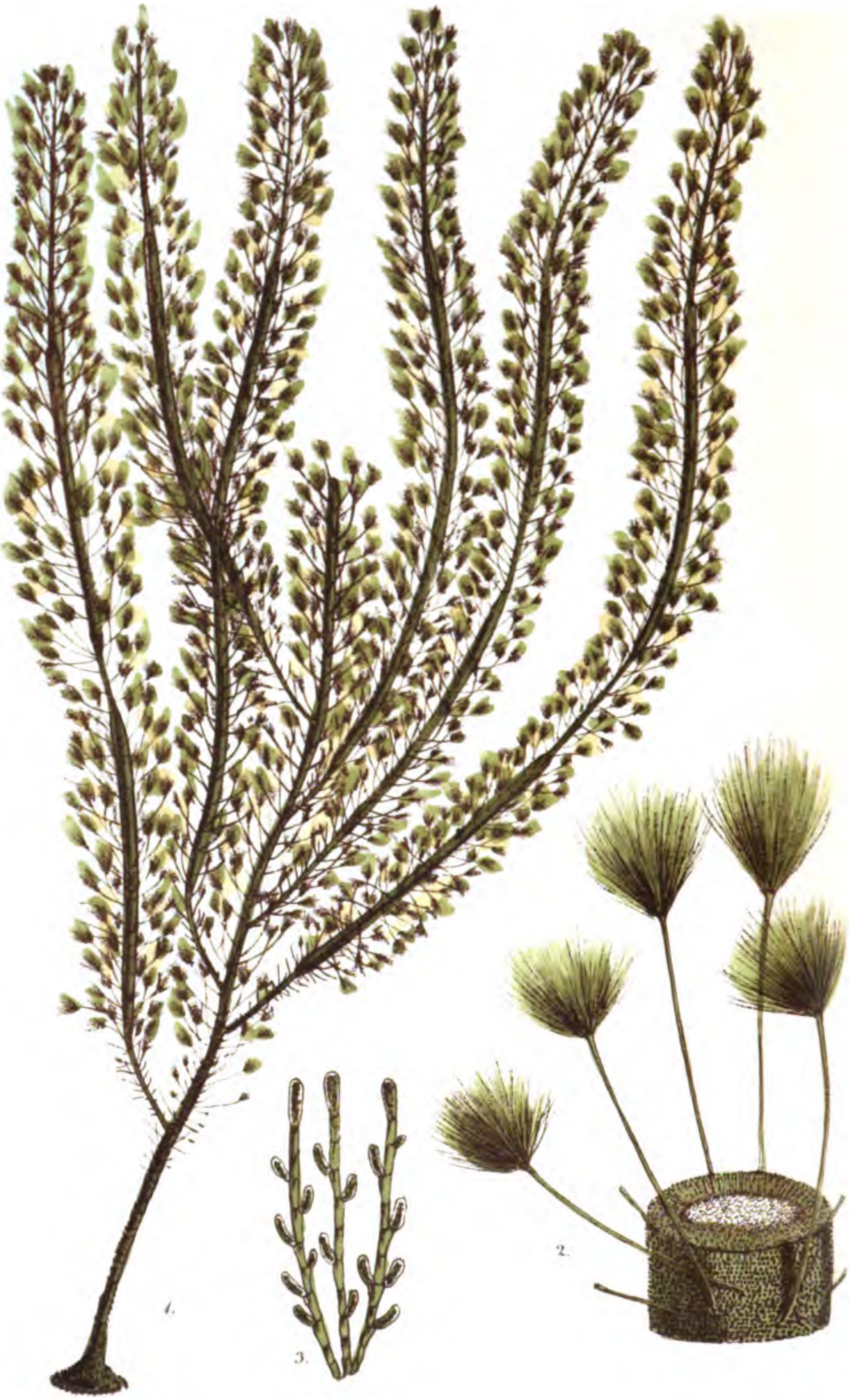
* * *

Of this beautiful and curious species I have seen but a single specimen, of which the upper figure in our Plate is an exact facsimile as to form and size. It is obviously only in a young state, and probably the fully developed frond would be of different shape and considerably larger. Its characters are, however, so strongly marked, that its specific entity cannot be questioned. From the other species of *Claudea* (*C. elegans* and *C. multifida*) it is at once known, besides other characters, by the decussate pattern of its reticulation. In the pattern there is more resemblance to *Vanvoorstia spectabilis*, but the evolution is distinctly that of a *Claudea*, not of *Vanvoorstia*.

The specific name is bestowed in honour of my valued friend Dr. George Bennett, of Sydney, well known as an accomplished naturalist, and from whom I experienced much kindness during my visit to New South Wales. I trust the publication of this figure may lead to further information respecting this very remarkable and, at present, *unique* Alga.

Fig. 1. CLAUDEA BENNETTIANA,—*the natural size*. 2. A portion of the network,—*magnified*. 3. A small fragment,—*more highly magnified*.

Plate LXII.



Vincent Brooks, Imp

PLATE LXII.

ENCYOTHALIA CLIFTONI, *Harv.*

GEN. CHAR. *Frond* filiform, solid, alternately branched; branches beset with penicillate, setaceous ramelli. *Receptacle* one or two in each branch, cylindrical, investing the middle portion of the branch, and consisting of simple, vertical, densely crowded paranemata. *Spores* attached to the paranemata, oblong, transversely striate.—ENCYOTHALIA (*Harv.*), from εγκυος, *pregnant*, and θαλος, *a branch;* the fertile branches are swollen.

Frons filiformis, solida, alterne ramosa; ramis ramellis setaceis penicillato-comosis per totam longitudinem obsessis. Receptaculum in quoque ramo unicum, cylindraceum, mediam partem rami circumvestiens, ex paranematibus simplicibus verticalibus dense stipatis constitutum. Sporæ ad paranemata laterales, oblongæ, transversim striatæ.

ENCYOTHALIA *Cliftoni*, Harv.

HAB. Cast ashore from deep water, at Fremantle, *George Clifton, Esq.*

GEOGR. DISTR. Western Australia.

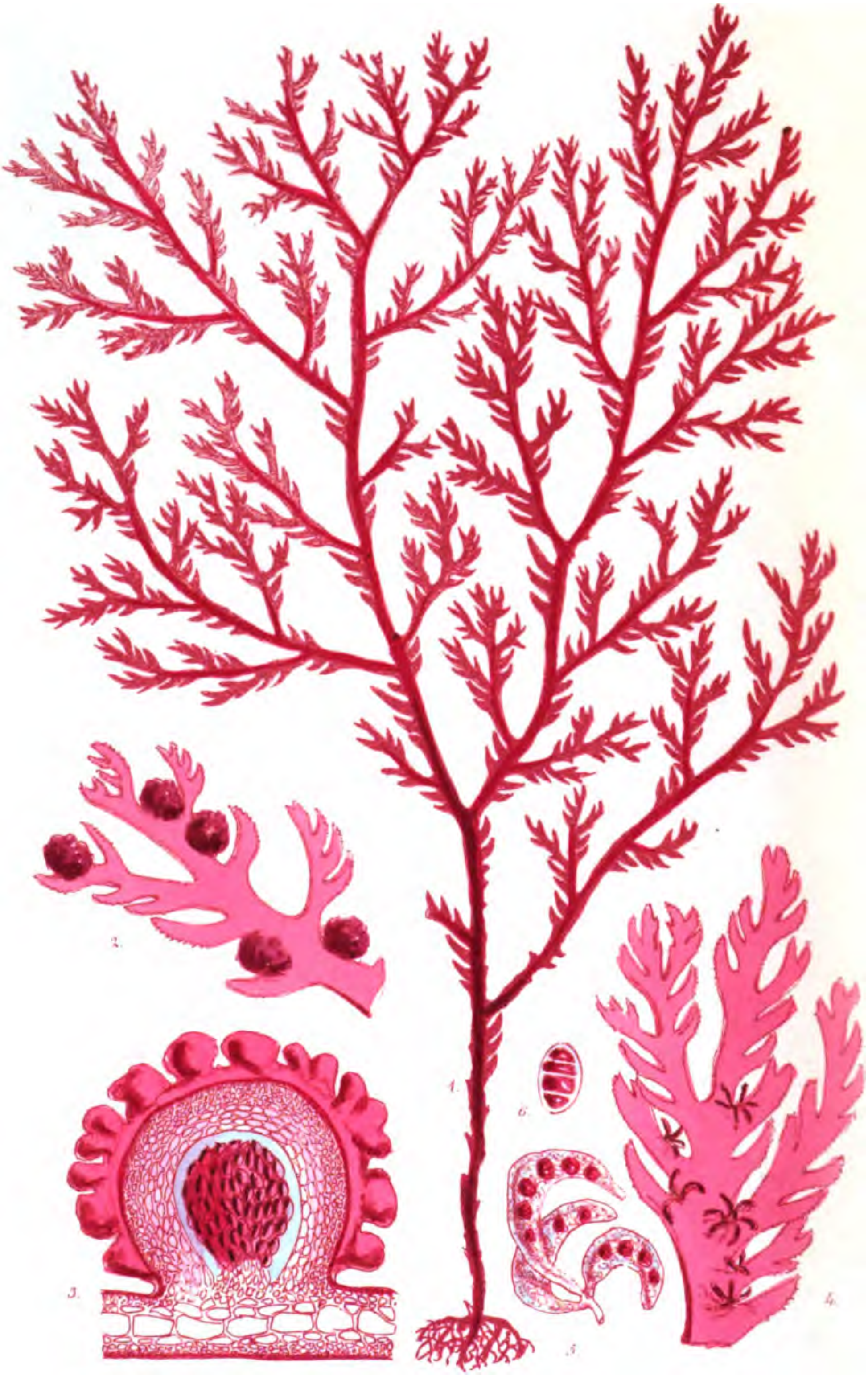
DESCR. *Root*, a large conical disc, ¼–½ inch in diameter, thickly clothed with hard, woolly fibres. *Stem* filiform, stupose at base, glabrous upwards, half a line or more in diameter, 1 or 2 feet long, simple, but furnished with numerous lateral branches, and beset with slender setaceous ramelli, which in a young state bear at the summits tufts of confervoid filaments. *Branches* alternate or irregularly inserted, virgate, quite simple, a foot or more in length, stupose at their origin, then glabrous and beset, like the stem, with setaceous, pencil-crowned ramelli. *Ramelli* inserted on all sides of the stem and branches, from ¼–½ inch long, spreading, bristle-shaped, minutely dilated at the summit; crowned with a dense pencil of very slender, articulated, soft filaments, which at length fall away. *Receptacles* one or two in each branch, sausage-shaped, occupying the middle region of the branch, and wholly formed of minute *paranemata*, whorled round the branch, and, in fact, formed out of elongations of the epidermal cells. To these paranemata, which are simple, with a sphacelate terminal cell, are laterally attached the oblong, obtuse *spores*, which at first are partly transparent, containing a few granules, and afterwards become more opaque, filled with endochrome. *Colour* of the branches and fruit a dark-olive; of the confervoid filaments somewhat paler. *Substance* rather rigid, the branches imperfectly adhering to paper; the pencils of the ramelli very soft, and closely adhering to paper in drying.

Here, with much of the external aspect of a *Sporochnus*, we have a perfectly new and distinct genus, more nearly related to *Bellotia* (to be figured in our next number) than to any other; but so different from that in habit, that its claim to separation will be readily admitted. From *Sporochnus* it differs in the position and structure of the receptacle; from *Bellotia* in the evolution of the branches, and the possession of lateral, brush-like ramelli. It establishes therefore a generic type almost exactly intermediate between *Sporochnus* and *Bellotia*, but far from uniting these genera, it rather strengthens the characters on which they have been respectively established.

This is one of the many discoveries we owe to Mr. Clifton, of Western Australia, who is indefatigable in investigating the algological treasures of that colony, and from whom, while this sheet is passing through the press, I have received an additional *batch* of interesting Algæ, among which is another new genus, which I purpose hereafter to figure under the name *Cliftonia*. Meantime the present species is gratefully and deservedly dedicated to its discoverer.

Fig. 1. ENCYOTHALIA CLIFTONI,—*the natural size*. 2. Portion of a *receptacle*, with penicillate ramuli *in situ*. 3. Some of the *paranemata*, with *spores* attached:—the latter figures variously *magnified*.

Plate LXII.



Vincent Brooks lith.

PLATE LXIII.

PLOCAMIUM PREISSIANUM, *Sond.*

GEN. CHAR. *Frond* membranaceo-cartilaginous, linear, plano-compressed, pinnately decompound; the pinnules alternately secund, in pairs or in threes or fours; composed of two strata of cells; the inner cells oblong, longitudinal; the outer polygonal, coloured, small. *Fructification:* 1, *conceptacles* sessile or pedicellate, hemispherical, with a cellular pericarp finally opening by a pore; sporiferous filaments numerous, radiating in several tufts from a basal placenta; 2, *tetraspores* lodged in proper spore-leaves (*stichidia*), oblong, transversely zoned.—PLOCAMIUM (*Lyngb.*), from πλοκαμος, *a tuft of hair.*

Frons membranaceo-cartilaginea, linearis, plano-compressa, pinnatim composita, pinnis alterne geminis ternis quaternisve, duplici strato contexto; cellulis interioribus majoribus oblongis longitudinalibus, superficialibus coloratis minutis polygonis. Fr.: 1, *cystocarpia sessilia v. pedicellata, hemisphærica, pericarpio celluloso demum carpostomio munita, fila sporigera fasciculata a placenta basali radiantia foventia;* 2, *tetrasporæ zonatim divisæ, in sporophyllis propriis nidulantes.*

PLOCAMIUM *Preissianum;* frond obsoletely costate, decompound-pinnate, pinnæ and pinnules alternately ternate or quaternate; the pinnules cultrate, subacute, denticulate on the outer edge, slightly falcate; spore-leaves fascicled in the axils of the pinnules, pedicellate, simple, arched, acute at each end, with a single row of tetraspores; conceptacles sessile, supra-axillary, warted.

P. Preissianum; *fronde medio incrassata vix costata decomposito-pinnata, pinnis pinnulisque alterne ternis quaternisve; pinnulis cultratis subfalcatis apice extrorsum denticulatis acutiusculis; sporophyllis axillaribus fasciculatis pedicellatis simplicibus arcuatis basi et apice acutis, serie simplici tetrasporas gerentibus; cystocarpiis sessilibus supra-axillaribus verrucosis.*

PLOCAMIUM Preissianum, *Sond. Pl. Preiss. v.* 2. *p.* 192. *Kütz. Sp. Alg. p.* 885. *J. Ag. Sp. Alg. v.* 2. *p.* 399. *Harv. Alg. Austr. Exsic. n.* 362.

HAB. Western Australia, *Preiss.* Very abundant at King George's Sound; and near Freemantle, and at Rottnest Island, West Australia, *W. H. H.*, *G. Clifton, etc.* South Australia, *Dr. Curdie.* Western Port, Victoria, *W. H. H.*

GEOGR. DIST. Western and southern coasts of Australia.

DISTR. *Root* much branched. *Fronds* tufted, 1-2 feet high, and a foot or more in expansion, somewhat flabelliform in outline, of a firmly membranous or subcartilaginous substance, decompoundly branched, distichous, everywhere preserving a breadth of from 1–2 lines. *Ramification* irregular, sometimes dense, with the branches very much divided, and their divisions closely crowded; sometimes more simple, with fewer and more distant branches. In all cases however the laciniæ of the frond are either ternate or quaternate, in which case the uppermost of the three secund laciniæ has a tendency to lengthen into a branch, while the lower remain as cultrate, tooth-like processes. The ultimate *pinnules* are 1–2 lines long, incurved or somewhat falcate, subacute, and more or less distinctly toothed along their outer edge, or rarely subentire. Faint indications of a midrib are seen in some specimens in the pinnæ; and in old fronds the stem and the principal branches are thickened in the middle and plano-convex. The *conceptacles* are solitary, about as large as poppy-seed, dark-coloured and very opaque, warted, and sessile on the edges of the branches; they are very irregularly scattered, occurring either above or in the axil of the pinnules or on the opposite edge of the branch: their pericarp is very thick. The *stichidia* are more contantly in the axils, and are falcato-fusiform, simple, tufted, containing a single row of tetraspores. The *colour* is a brilliant crimson, becoming brighter in fresh-water.

The genus *Plocamium*, which has but one representative in the northern hemisphere, has many southern species, distributed chiefly in Australia and South Africa. Of these the present is a beautiful and readily known and abundant species, differing from most of the Australian kinds in having sessile conceptacles, and ramuli alternating in *threes*, not in *twos*. In both these characters it agrees with the cosmopolitan *P. coccineum*, from which it is readily known by the warted conceptacles and denticulate edges of the ramuli.

Fig. 1. PLOCAMIUM PREISSIANUM,—*the natural size*. 2. Part of a pinna, with *conceptacles*. 3. Vertical section through a *conceptacle* and branch. 4. Part of a pinna with axillary *stichidia*. 5. Three of the *stichidia* removed. 6. A tetraspore:—the latter figures variously *magnified*.

Plate LVIII

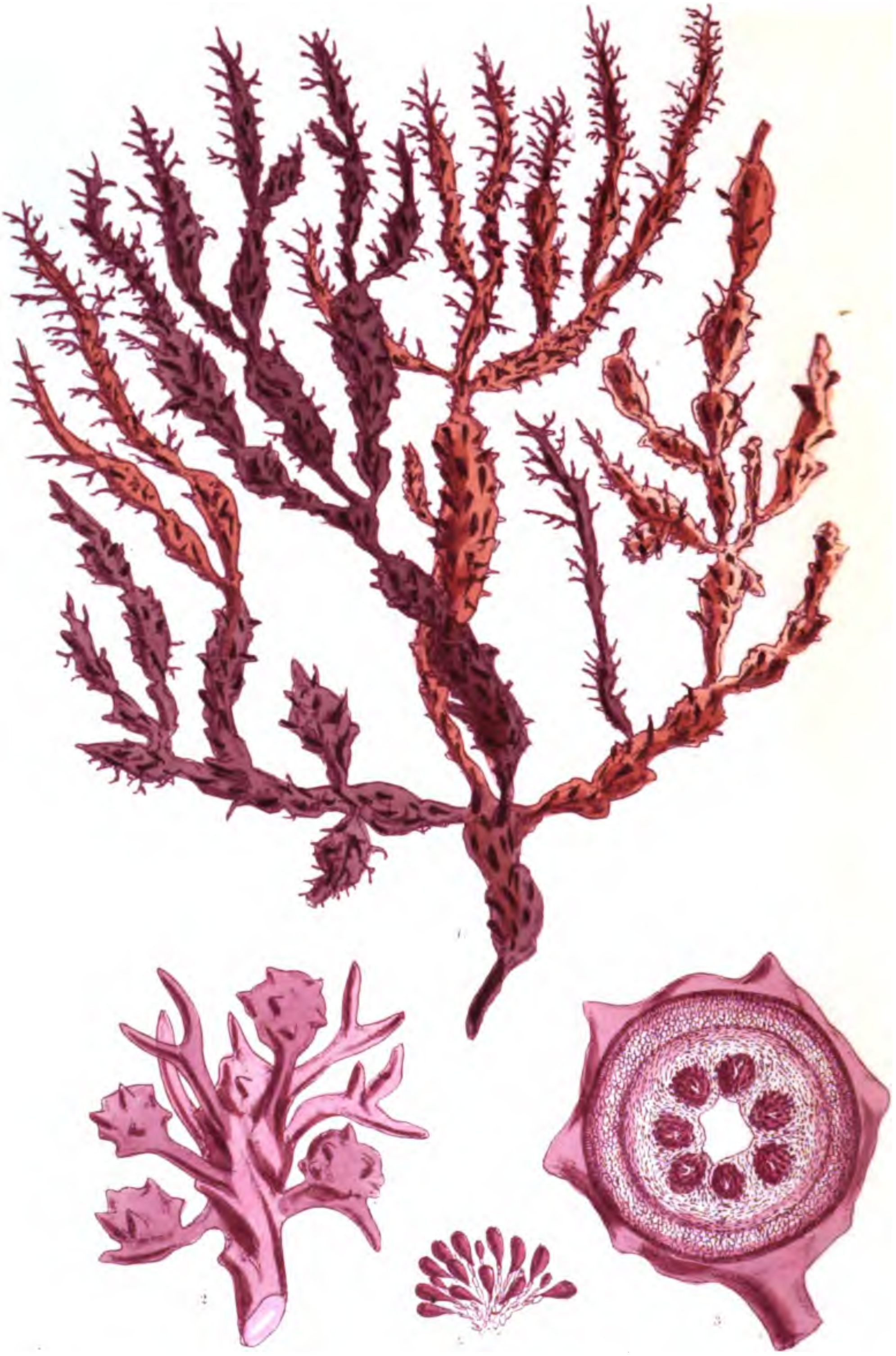


PLATE LXIV.

EUCHEUMA SPECIOSUM, *J. Ag.*

GEN. CHAR. *Frond* shrub-like, carnoso-cartilaginous, horny when dry, spiny or tubercled, solid, composed of three strata; the *medullary* stratum, of densely interwoven, elongated, anastomosing, longitudinal filaments; the *intermediate,* of several layers of roundish, angular cells, gradually smaller outwards; the *cortical,* of minute, coloured cellules set in radiating filaments, at right angles to the axis. *Fructification:* 1, *conceptacles* subglobose, sessile on the ramuli, containing, within a very thick pericarp, a central placenta (becoming hollow in the middle), to which tufts of spore-threads are attached; *spores* seriated or solitary, oblong or subpyriform; 2, zonate *tetraspores,* immersed in the cortical stratum.—EUCHEUMA (*J. Ag.*), from *ευ,* intensitive, and *χευμα, that may be melted;* because the species may be dissolved to a jelly.

Frons fruticosa, carnoso-cartilaginea, subcornea, immerse costata, spinosa v. papillosa, triplici strato constituta; medullari filis elongatis intertextis anastomosantibus; intermedio cellulis rotundato-angulatis extus minoribus; corticali cellulis minutis in fila verticalia conjunctis. Fruct.: 1, *cystocarpia subglobosa, sessilia, inter pericarpium crassum fila sporifera fasciculata ex placenta centrali emissa foventia; sporis subseriatis, ovalibus v. pyriformibus;* 2, *tetrasporæ zonatim divisæ, sparsæ.*

EUCHEUMA *speciosum;* frond polymorphous, terete or compressed, irregularly constricted or nodose, subdichotomous; branches tapering at base, thickest in the middle, once or twice compound, beset on all sides with slender, setaceous, simple or branched processes, or tuberculated; conceptacles mostly terminating the filiform ramenta, spinous or papillate.

E. speciosum; *fronde polymorpha tereti v. compressa constricta v. nodosa subdichotoma; ramis basi angustatis medio incrassatis ramosis ramulis setaceis indefinitis tuberculisve plus minus obsessis; cystocarpiis papillosis ramulos sæpius terminantibus.*

EUCHEUMA speciosum, *J. Ag. Sp. Alg. v.* 2. *p.* 629. *Harv. Alg. Austr. Exsic. n.* 347.

GIGARTINA speciosa, *Sond. Pl. Preiss. v.* 2. *p.* 175. *Kütz. Sp. Alg. p.* 751.

HAB. Cast ashore from deep water. Fremantle and Rottnest Island, Western Australia, *Preiss, W. H. H., etc.*

GEOGR. DISTR. Western Australia.

Descr. *Root?* *Frond* 6–12 inches long, robust, shrubby, somewhat fastigiate, but very irregularly branched, either much or little divided, and varying from one to five or six lines in diameter, terete or compressed. Sometimes the whole frond consists of ellipsoidal, obtusely tuberculed or papillate, swollen portions, strung together by slender, cylindrical necks; the terminal swellings more or less bristling with filiform ramenta. Sometimes the swellings have a spindle shape, and are several times longer than their diameter; the narrow parts proportionally short. Again, specimens occur which are but little swollen, and only constricted at the insertion of the branches; these are generally more slender than ordinary specimens, and more copiously beset with spine-like ramenta. Flattened specimens are less common. The *ramenta* vary greatly in density and in their development; when copious they completely clothe the branches (much more densely than our figure represents), and are from quarter to half an inch long, and more or less branched. In other specimens they are mere knobs, or disappear altogether. *Conceptacles* about as large as poppy-seed, tuberculate, borne on the ramenta; becoming hollow in the centre, and containing numerous tufts of spores, ranged round a central placenta; *spores* pyriform. *Colour*, when quite fresh, a dark livid-purple; changing on exposure to scarlet, orange, yellow, and white. *Substance* cartilaginous when fresh, horny and semitransparent when dry. It does not adhere to paper in drying.

Very variable in habit and in colour; but, once seen, easily recognized under all its shapes. This is the "*Jelly-plant*" of the colonists of Western Australia, who use it in the manufacture of jellies and blancmanges, as *Chondrus crispus* (Carrageen) is used in England; and as *Gracilaria lichenoides* and others are used in the East. All yield, on long boiling, mucilages of a similar description, containing (according to the analysis of Dr. Apjohn) nitrogen in considerable quantity, and therefore having a fair claim to be regarded as nourishing food.

Fig. 1. Eucheuma speciosum,—*the natural size.* 2. Fragment with ramenta and conceptacles. 3. Section through a conceptacle. 4. *Spores* from one of the spore-tufts:—the latter figures variously *magnified.*

Plate L

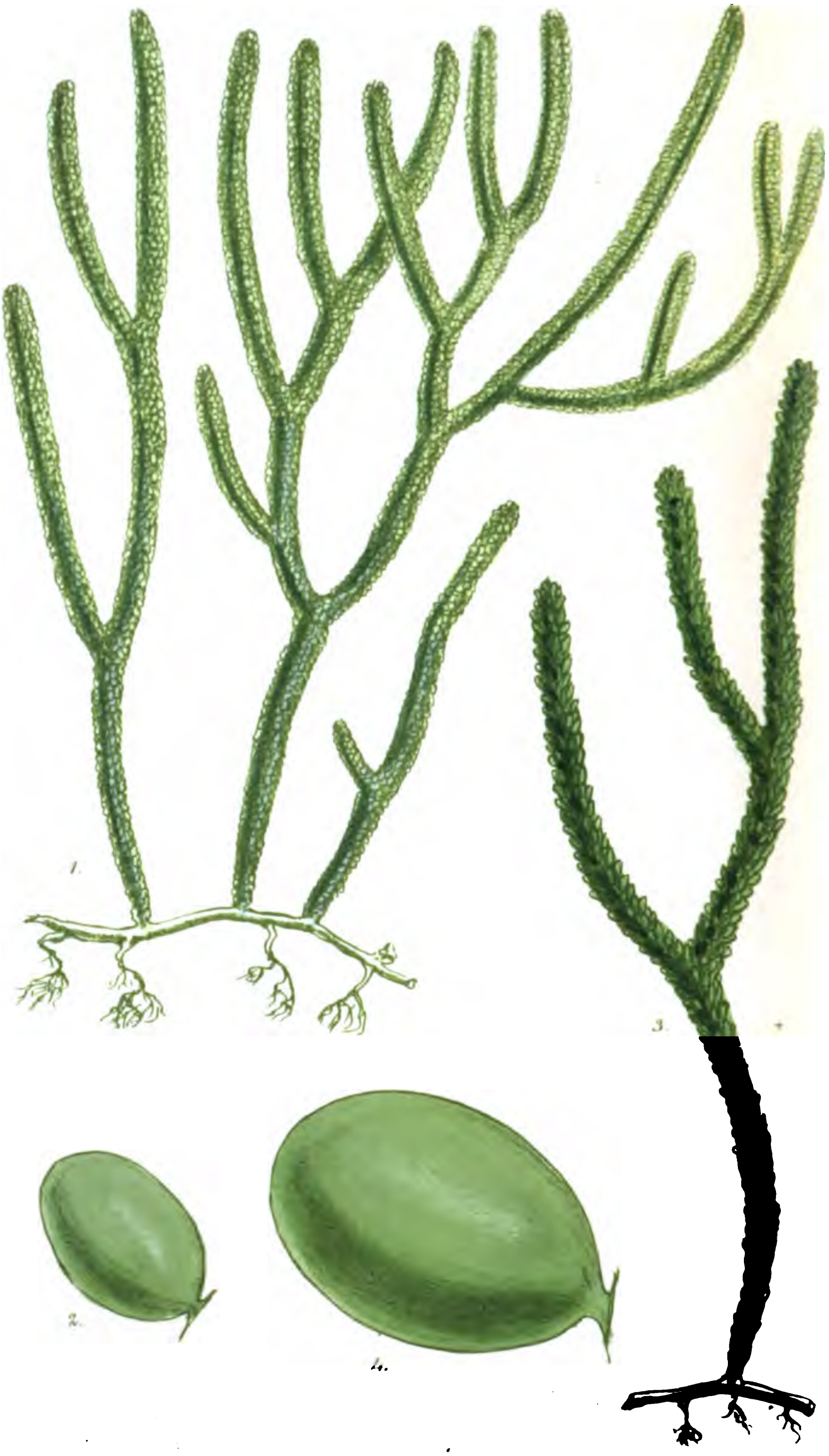


Plate LXV.

CAULERPA SIMPLICIUSCULA, *Ag.*

Gen. Char. *Frond* consisting of prostrate *surculi* rooting from their lower surface and throwing up erect branches or secondary fronds of various shapes. *Substance* horny-membranous, destitute of calcareous matter. *Structure* unicellular, the cell (*frond*) continuous, strengthened internally by a spongy network of anastomosing filaments, and filled with semifluid grumous matter. *Fructification* unknown.—Caulerpa (*Lamour.*), from *καυλος, a stem,* and *ἑρπω, to creep.*

Frons ex surculis prostratis hic illic radicantibus et ramis erectis polymorphis formata. Substantia corneo-membranacea. Structura unicellulosa, cellulæ membrana continua hyalina intus filis cartilagineis tenuissimis anastomosantibus firmata et endochromate denso viridi repleta. Fr. ignota.

Caulerpa *simpliciuscula;* surculus robust, glabrous; fronds erect, cylindrical, papillated, subsimple or sparingly branched; branches alternate, equal, obtuse, subcorymbose; every portion of stem and branch densely covered with minute, ellipsoidal ramenta.

C. simpliciuscula; *surculo robusto glabro; fronde erecta cylindracea papillata simpliciuscula v. sparsim ramosa; ramis erectis alternis æqualibus obtusis subcorymbosis, cum caule ubique ramentis minutis ellipsoideis densissime velatis.*

Caulerpa simpliciuscula, *Ag. Sp. Alg. v.* 1. *p.* 439; *Syst. p.* 182. *Endl. 3rd Suppl. p.* 16. *Harv. Alg. Austr. Exsic. n.* 561.

Chauvinia simpliciuscula, *Kütz. Sp. Alg. p.* 499.

Codium simpliciusculum, *Grev. Syn. p.* lxvii.

Fucus simpliciusculus, *R. Br. in Turn. Hist. t.* 175.

Var. β. *vesiculifera;* more slender, with much larger ramenta.

Var. β. vesiculifera; *gracilior, ramentis quadruplo majoribus.*

Caulerpa vesiculifera, *Harv. MS. Alg. Austr. Exsic. n.* 560.

Hab. In deep tide-pools near low-water mark. On the "Jetty" reef, Rottnest Island, W. Australia; also at Port Fairy; Port Phillip Heads and Western Port, Victoria, *W. H. H.* Tasmania, *Mr. Gunn, W. H. H., etc.* S. Australia, *Dr. Curdie.* Var. β. at Western Port and in Tasmania.

Geogr. Distr. Western and southern coasts of Australia. Tasmania.

Descr. *Surculi* a line or more in diameter, branched, several inches long, densely matted, with frequent rooting processes, glabrous, pale-green, glossy when dry. *Fronds* from an inch to 6–12 inches or more in length, from 1–3 or 4 lines in diameter, cylindrical, obtuse, of equal diameter throughout, sparingly and very irregularly branched, and everywhere densely clothed with minute papillæform ramenta. The branches are remarkably erect, and their summits frequently stand at a level, giving a corymbose character to the frond; they are alternate, or opposite, or secund, and are occasionally binate. In var. β the ramenta are much larger than in the ordinary form, more swollen and more loosely set, but they are of the usual elliptical form, and intermediate states are found. The *colour* is a pale-green in var. α; and a much fuller and darker green in β. The *substance* of both is firm, becoming rigid when dry, in which state the frond does not adhere to paper.

This plant varies but little in its ramification, but, at different depths of water, it varies greatly in its diameter, and in the closeness or laxity and the size of the oval ramenta that cover its branches. When growing in shallow tide-pools, near the summit of the reef, it is greatly dwarfed, but not otherwise changed. The slender varieties are from deep water. The var. β, which I had at one time felt disposed to separate specifically, grew in deep tide-pools near low-water mark, and was of so much more brilliant colour and more lubricous substance than var. α, and had such large ramenta, that, when growing, it looked very different. Afterwards I found some intermediate specimens that connected it with the normal form.

Though common in many places along the west and south coasts of Australia, *C. simpliciuscula* has, until very recently, been only known to most botanists by Turner's figure and description.

Fig. 1. CAULERPA SIMPLICIUSCULA, the normal form,—*natural size*. 2. One of its ramenta,—*magnified*. 3. Var. β. VESICULIFERA,—*the natural size*. 4. One of its ramenta,—*magnified to the same scale as fig*. 2.

Plate LXVI

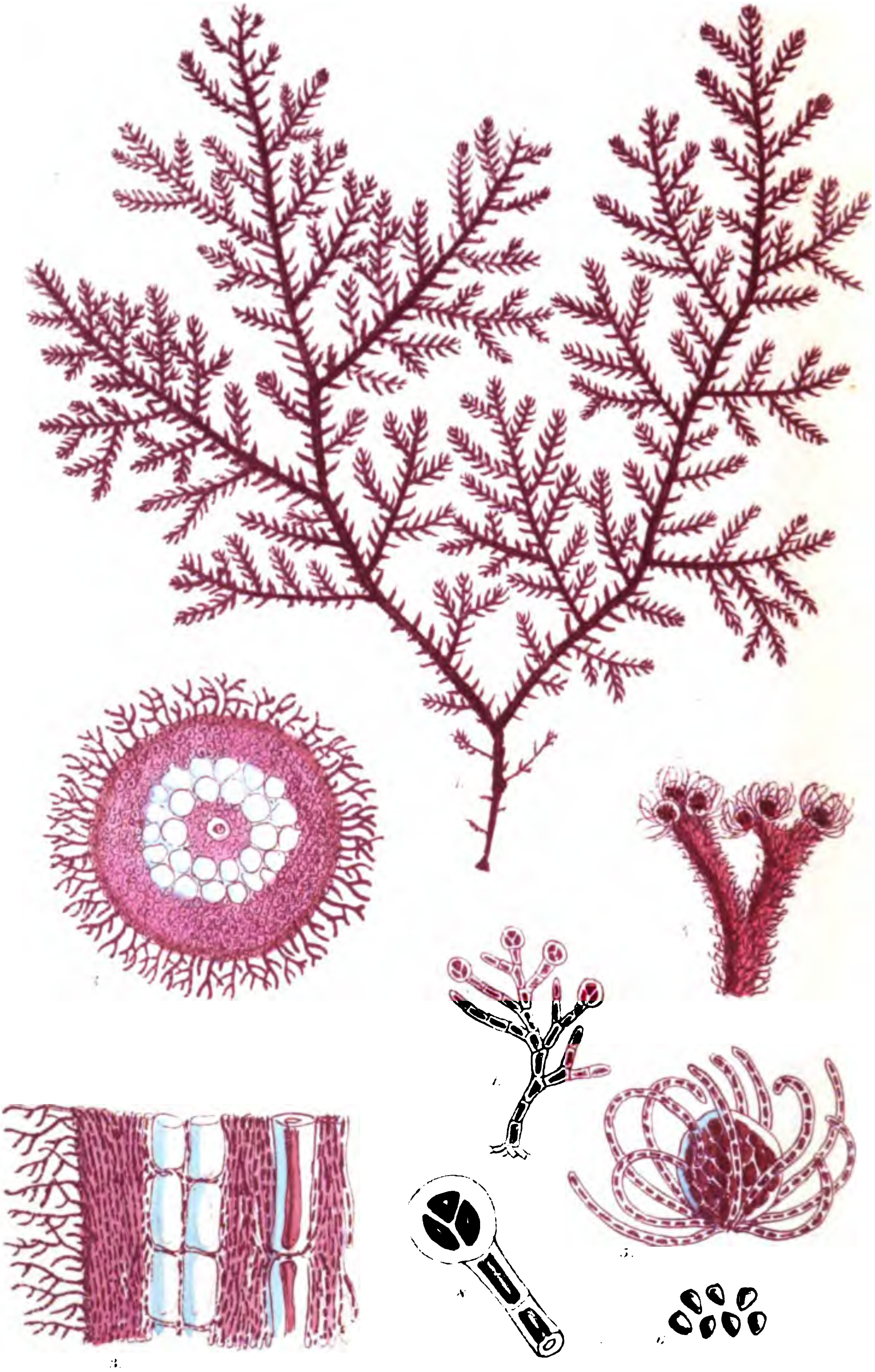


PLATE LXVI.

DASYPHILA PREISSII, *Sond.*

GEN. CHAR. *Frond* filiform, distichous, decompound-pinnate, inarticulate, fibroso-cellular, with an articulated monosiphonous axis; the surface densely clothed with articulated, free, hair-like ramelli. *Fructification:* 1, involucrate *favellæ*, terminating short branches, and containing numerous angular spores; 2, tripartite *tetraspores*, formed at the tips of the investing ramelli.—DASYPHILA (*Sond.*), from δασυς, *hairy*, and φιλεω, *to love?*

Frons filiformis, disticha, decomposite pinnata, inarticulata, fibroso-cellulosa, axi articulato monosiphonio percursa, et filis minutis ramosis articulatis undique vestita. Fruct.: 1, *favellæ involucratæ* (*ut in* Ptilota); 2, *tetrasporæ ex articulis terminalibus filorum formatæ, triangule divisæ.*

DASYPHILA *Preissii*, Sond.

DASYPHILA Preissii, *Sond. in Mohl and Sch. Bot. Zeit.* 1845, *p.* 53. *Sond. in Pl. Preiss. v.* 2. *p.* 169. *Kütz. Sp. Alg. p.* 673. *J. Ag. Sp. Alg. v.* 2. *p.* 104. *Harv. Alg. Austr. Exsic. n.* 483.

HAB. On the stems of the larger Algæ, in deep water. Western Australia, common, *Preiss! W. H. H., etc.* Port Phillip Heads, and Western Port, Victoria, *W. H. H.*

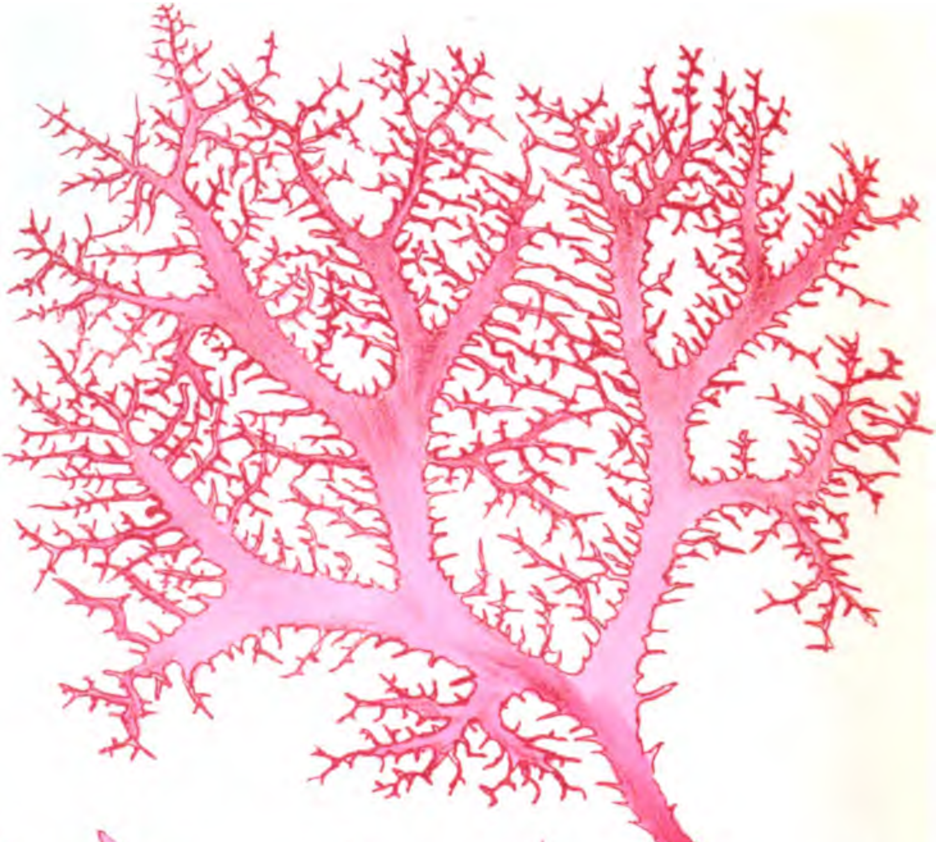
GEOGR. DISTR. Western and southern coasts of Australia.

DESCR. *Root* discoid. *Frond* 4–8 inches long, and as much in the expansion of the branches, filiform, half a line in diameter, opaque, everywhere velvety with a thick coating of minute, irregularly branched, hair-like ramelli. The *ramification* is distichous, and several times pinnately compounded, the branches and their divisions being all alternate. The primary pinnæ are of unequal length and development, long and short occurring on the same branch, the shorter being but once or twice pinnulate, the longer thrice or four times. The pinnæ and pinnules are patent; the axils obtuse; and the ultimate pinnules subulate, nearly horizontal, and 1–2 lines in length. The *ramelli* are microscopical, irregularly branched, articulate, confervoid, with the joints scarcely twice as long as broad. The *stem* is composed as follows: a single axial tube of large diameter, articulated and containing endochrome, runs through the whole frond, sending branches to each of its divisions; round this are densely packed innumerable longitudinal, articulated, coloured filaments of small diameter; then a single, double, or triple circle of larger longitudinal filaments; and lastly, the cortical layer, of various thickness, composed of slender filaments similar to those that invest the axis, and externally emitting the free, horizontal ramelli that form the velvety surface. The *favellæ* are borne, 2 or 3 together, on the tips of short branches, where they are densely involucrated with slender, hair-like, incurved ramelli. The *tetraspores* occur abundantly, on separate individuals, on the tips of the ramelli, of the branches, and ramuli. The *colour* is a dark vinous red-brown. The *substance* is rigid, and the frond very imperfectly adheres to paper in drying.

This handsome plant might, without much violence, be considered as a species of *Ptilota,* from which genus *Dasyphila* differs merely by having the frond externally covered with a velvety stratum of microscopic filaments. There is no essential difference in the fructification, especially if we compare it with our *Ptilota striata* (Plate LXXI.), which may almost be regarded as a *glabrous* "Dasyphila,"—if such were admissible.

In the generic character of *Dasyphila,* I have omitted minutely to describe the cellular structure of the stem, because in *Ptilota* —so nearly allied—this is a character little regarded; for, if attended to, it would necessitate the formation of several genera out of the species now grouped under *Ptilota.* When we come to figure more of the Australian species of that genus, this fact will be apparent, and would be still more so did our figures extend to all known species. Still, I am not at all disposed to break up so natural an assemblage as *Ptilota* appears to be, by too strict an examination into a purely anatomical character. When anatomical characters are accompanied by difference of fruit and of habit, they are valuable aids in limiting genera; but alone, they seem scarcely sufficient.

Fig. 1. DASYPHILA PREISSII,—*the natural size.* 2. Cross section of a branch. 3. Longitudinal semi-section. 4. Tips of branches, bearing favellæ. 5. A favella, with involucral ramelli. 6. Spores from the same. 7. A ramellus with tetraspores. 8. One of its fertile segments removed:—the latter figures variously *magnified.*



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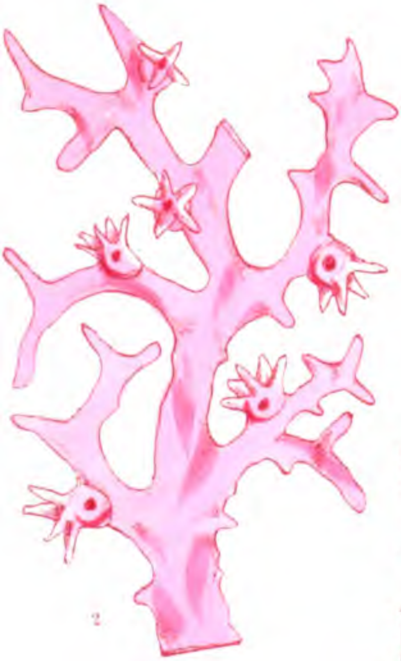

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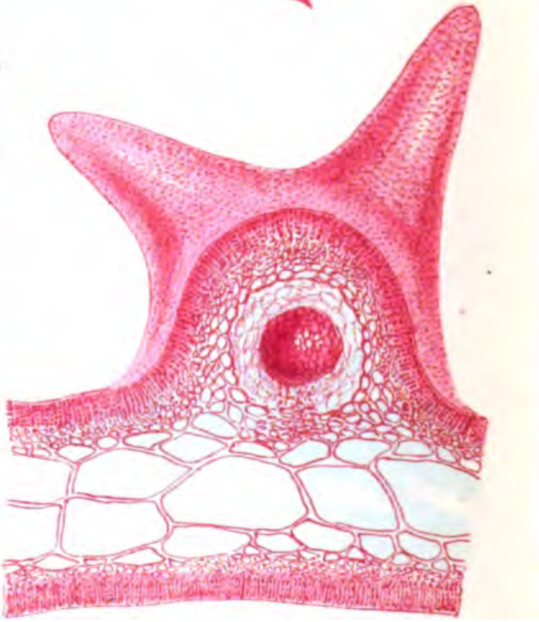


3.

Vincent Brooks, Imp.

PLATE LXVII.

HOREA HALYMENIOIDES, *Harv.*

GEN. CHAR. *Frond* fleshy-membranous, plano-compressed, composed of three strata of cells; the *medullary* stratum, of large, empty, thin-walled cells (often ruptured); the *intermediate*, of several rows of smaller, coloured, angular cells; the *cortical*, of vertical, dichotomous, moniliform filaments, set in gelatine. *Fructification:* 1, *favellæ* within a proper external pericarp crowned with spines, and opening by a pore, attached to a basal placenta, invested with cobwebby interwoven filaments, and containing angular spores; 2, cruciate *tetraspores*, dispersed among the filaments of the cortical stratum.—HOREA (*Harv.*), in honour of the Rev. W. S. Hore, an accomplished naturalist.

Frons carnoso-membranacea, plano-compressa, ex stratis tribus cellularum composita; stratum medullare cellulis maximis inanibus demum sæpe ruptis, intermedium cellulis pluriseriatis minoribus coloratis, corticale filis moniliformibus verticalibus dichotomis muco cohibitis formatum. Fruct.: 1, *favellæ intra pericarpium externum apice spinis coronatum poro pertusum, ad placentam basalem affixæ, filis arachnoideis laxe circumdatæ, sporas conglobatas angulares foventes;* 2, *tetrasporæ sparsæ, cruciatim divisæ.*

HOREA *halymenioides;* frond dichotomous, rose-red, membranaceous; the segments attenuate, decompound-pinnate, pinnæ and pinnules slender, divaricate, patent, attenuate, acute, sometimes inosculating; conceptacles 4–5-horned, very numerous.

H. halymenioides; *fronde dichotoma v. vage divisa rosea gelatinoso-membranacea; laciniis attenuatis decomposito-pinnatis; pinnis pinnulisque divaricato-patentibus attenuatis acutis nunc spurie anastomosantibus, pinnulis setaceis.*

HOREA halymenioides, *Harv. in Trans. R. I. Acad. v.* 22. *p.* 555; *Alg. Austr. Exsic. n.* 437.

HAB. Cast up from deep water, after storms. Fremantle, common, *W. H. H.*, *G. Clifton.* King George's Sound, *W. H. H.*

GEOGR. DISTR. West and south-west coasts of Australia.

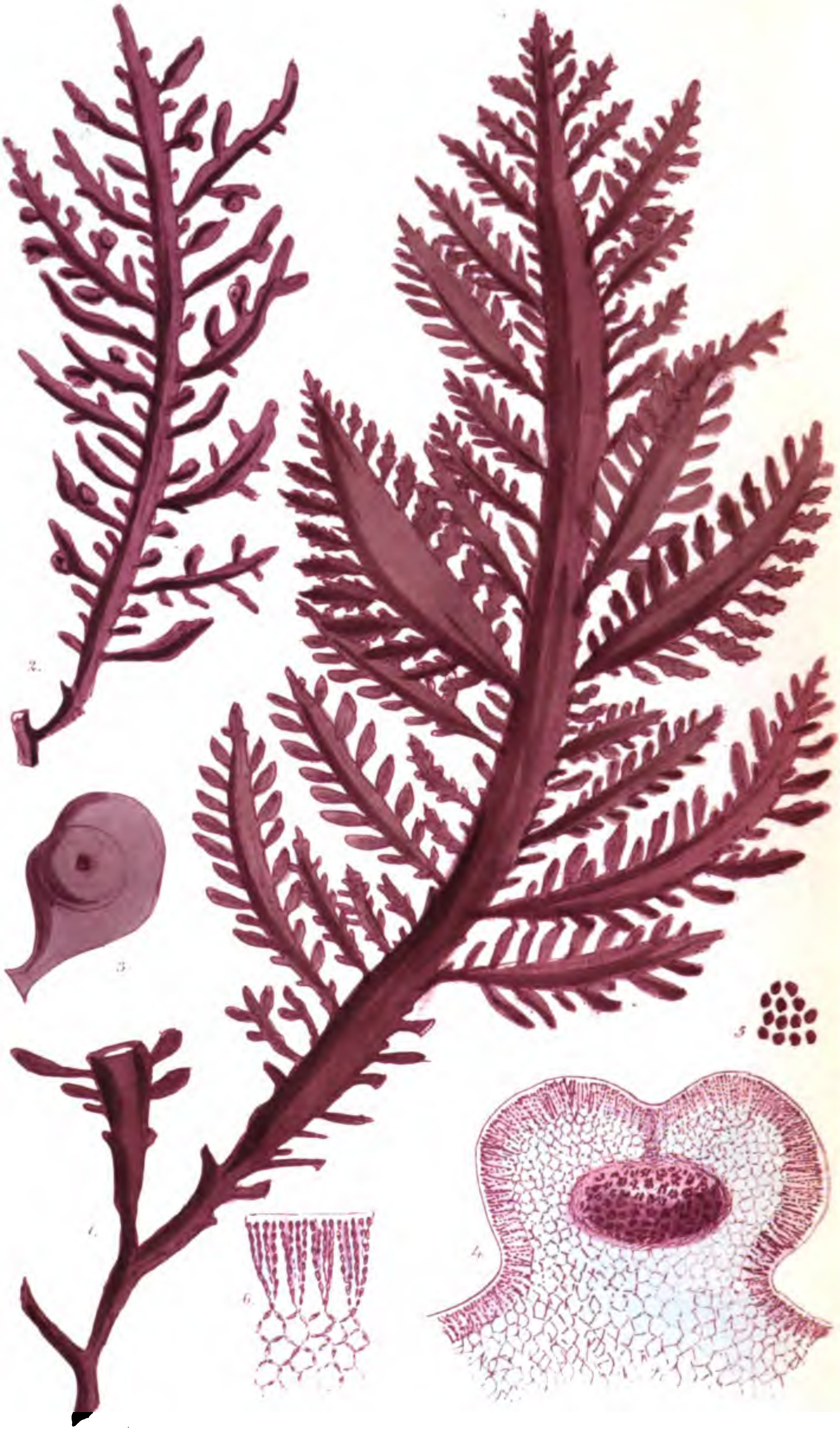
DESCR. *Fronds* densely tufted, 6–8 inches long, polymorphous, excessively variable in the amount of ramification. The primary division of the frond is dichotomous, and is often very regularly forked, the laciniæ varying in breadth from 2–4 lines, and tapering gradually to the apex. Sometimes the margin of this forked frond is perfectly simple and entire; but more frequently it emits laterally pinnate lacinulæ, which gradually lengthen and become again pinnulate with greater or less regularity. All the divisions are remarkably patent; those of the pinnæ divaricated, and all taper to the extremity. In some specimens the whole surface of the dichotomous primary leaf, as well as the margin, emits slender, divaricating, much branched segments; and in others the frond is resolved into an inextricable mat of such much-branched and often almost filiform laciniæ, which frequently adhere together by their sides or tips, and at length inosculate. In other specimens the dichotomous portion is very narrow; and the marginal laciniæ short and hair-like; the whole frond simulating a *Hypnea!* The *conceptacles* are generally marginal, sessile, scattered, with a 4–5-horned crown, semi-transparent, and containing a dark-red mass of spores. The cruciate *tetraspores* are scattered irregularly among the cells of the cortical layer. The *colour* is generally a clear rosy-red, sometimes blood-red, and occasionally with a purplish tinge. The *substance* soft, somewhat gelatinous, but not soon decomposing. In drying, the plant adheres closely to paper, and is glossy.

With the semi-gelatinous substance, colour, and habit of a *Halymenia,* the genus here illustrated differs both in anatomical structure and in fruit; and all the four species now known agree in the curiously *horned* or crowned conceptacles. The present species is extremely variable in the breadth and ramification of the secondary laciniæ, and several varieties might be enumerated, all connected however by intermediate forms, varying from the broad and simple to the nearly filiform, much branched, and entangled. Sometimes indeed the frond is resolved into an inextricable mat of slender branches, which everywhere stick together by discs, and actually grow one into the other.

Horea speciosa and *H. polycarpa,* being figured in the 'Flora of Tasmania,' will not be repeated in the present work.

Fig. 1. HOREA HALYMENIOIDES,—*the natural size.* 2. Part of a fertile frond,—*somewhat magnified.* 3. Section through a pericarp and portion of the frond,—*more highly magnified.*

Plate LIII



Vincent Brooks Imp.

Plate LXVIII.

GIGARTINA PINNATA, *Ag.*

Gen. Char. *Frond* carnoso-cartilaginous, flat or cylindrical, simple or variously branched, composed of two strata of cells; the medullary stratum, of cylindrical, articulated filaments, anastomosing into a very lax network; the cortical, of moniliform, vertical, dichotomous filaments set in firm gelatine. *Fructification:* 1, external, globose, finally perforate *conceptacles*, containing within a saccate *placenta* (?) formed of closely interwoven filaments, a compound *nucleus* consisting of many confluent *nucleoli*, or masses of roundish-angular spores; 2, cruciate *tetraspores*, collected into dense, subprominent sori, lodged beneath the superficial cells.—Gigartina (*Lamour.*), from *γιγαρτον, a grape-stone,* which the conceptacles resemble.

Frons carnoso-cartilaginea, plana v. cylindracea, ramosa, ex stratis duobus cellularum composita; stratum medullare ex filis tenuibus cylindraceis laxe anastomosantibus, corticale ex filis moniliformibus verticalibus dichotomis formatum. Fruct.: 1, *favellidia intra pericarpium externum carpostomio pertusum excepta, filis arachnoideis intertextis obvoluta;* 2, *tetrasporæ cruciatim divisæ in soros subprominentes infra stratum corticale nidulantes plurimæ collectæ.*

Gigartina *pinnata;* frond flattened, linear, decompound-pinnate; pinnæ and pinnules distichous, linear-lanceolate, narrowed at the base and apex, patent, obtuse; conceptacles sessile, marginal, depressed, umbilicate.

G. pinnata; *fronde complanata lineari decomposite pinnata; pinnis pinnulisque distichis lineari-lanceolatis basi angustatis patentibus obtusis; cystocarpiis sessilibus marginalibus depressis umbilicatis.*

Gigartina pinnata, *J. Ag. Sp. Alg. v.* 2. *p.* 270. *Harv. Alg. Austr. Exsic. n.* 399.

Hab. Port Phillip Heads, *Malm., W. H. H.* South Australia, *Dr. Curdie.* Tasmania, *Mr. Gunn.*

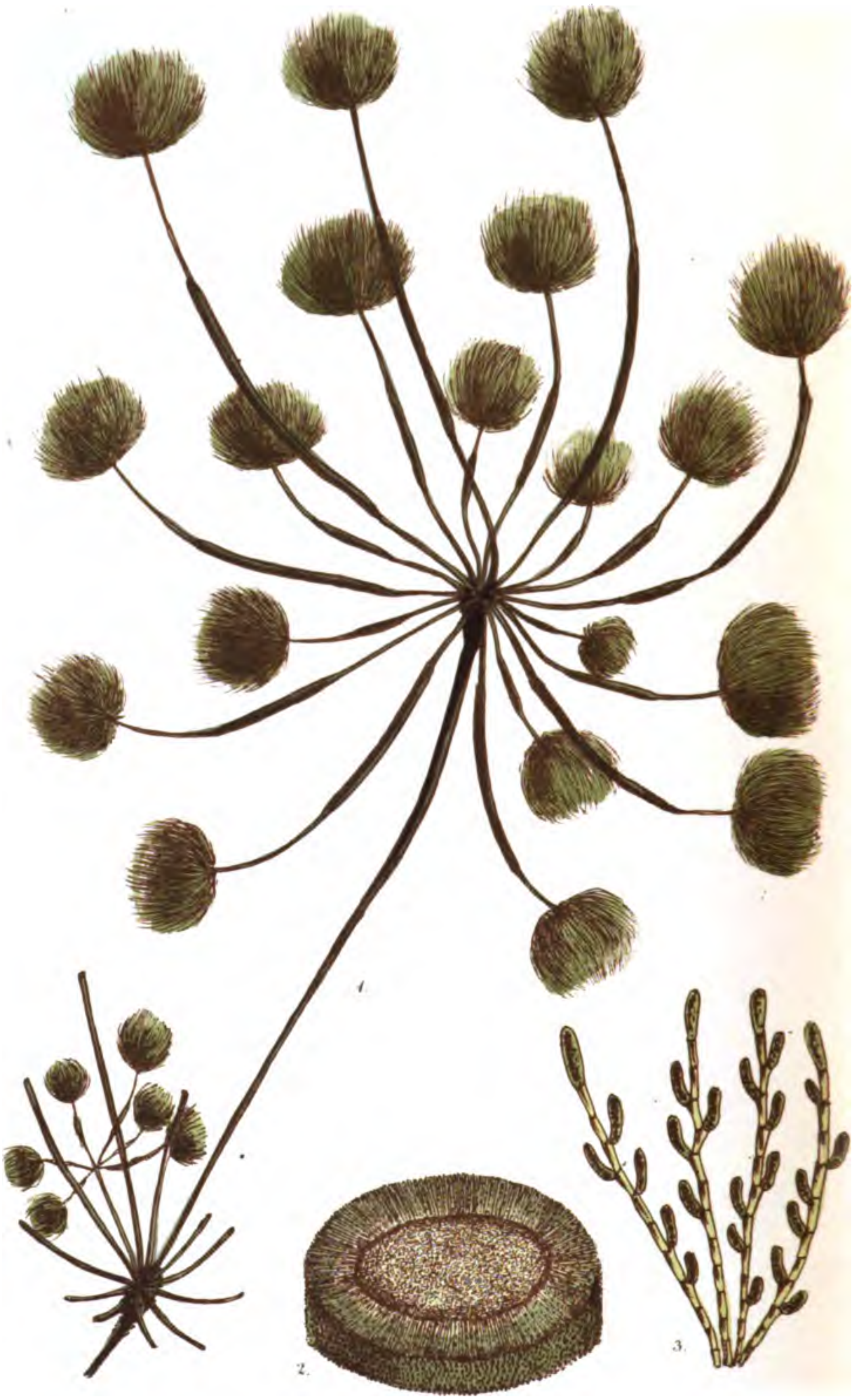
Geogr. Distr. Southern coasts of Australia. Tasmania.

Descr. *Root* discoid. *Fronds* tufted, 1–2 feet in length, flattened, from ¼ to nearly ½ inch in breadth, twice, thrice, or four times pinnate. *Pinnæ* and *pinnulæ* strictly distichous, issuing from the margin of the flattened frond, unequal in size and development, large and small occurring intermixed; the larger 8–10 inches long or more. The pinnules are narrower, somewhat thickened in the middle, but not cylindrical: they vary much in breadth and in shape, being sometimes broadly lanceolate and sometimes nearly linear. Both forms occur together, and sometimes on the same specimen. *Cystocarps* generally occur on the narrower varieties, and mostly on the margins of the smaller pinnules. Agardh describes the *sori* of tetraspores as being linear and marginal. The *colour* is a deep vinous red-brown. The *substance* is firm, cartilaginous, horny when dry; and the plant does not adhere to paper.

In the genus *Gigartina*, as now understood, are retained a considerable number of species, dispersed over most parts of the world, from the tropics to high northern and southern latitudes; differing very much in external habit, but all agreeing in structure and fructification, and in the livid- or brownish-purple colour of the frond. Some (like *G. radula*), have broad, simple leaves, resembling those of an *Iridæa;* others have flabelliform fronds like those of a *Chondrus* or *Gymnogongrus;* others are shrubby and irregularly branched, like a *Gracilaria;* and others, again, in the regularly pinnated and distichous ramification, like our *G. pinnata,* remind us of the *Laurenciæ.* The present is one of the finest of the Australian kinds, and would require a folio plate to do it full justice. It varies considerably, and I shall not be surprised if future observations, made on the shores of Australia, should compel the union of *G. livida* and some others with it.

Fig. 1. GIGARTINA PINNATA, a branch,—*of the natural size.* 2. Fertile branchlet of a larger frond,—*natural size.* 3. A ramulus, with conceptacle. 4. Section through conceptacle, showing structure of frond and *favellidium.* 5. Spores. 6. Portion of the cortical layer and medullary network,—the latter figures variously *magnified.*

Plate LXIX.



Vincent Brooks Imp.

PLATE LXIX.

BELLOTIA ERIOPHORUM, *Harv*,

GEN. CHAR. *Frond* filiform, solid, umbellately branched; the branches crowned with a tuft of penicillate filaments. *Receptacle* solitary in each branch, cylindrical, surrounding the middle portion of the branch, composed of simple, vertical, densely crowded paranemata. *Spores* on the sides of the paranemata, oblong, transversely striate.—BELLOTIA (*Harv.*), in memory of Lieut. Bellot, of the French Navy, who volunteered his services in one of the Franklin searching voyages, and perished in the Polar Sea.

Frons filiformis, solida, umbellatim ramosa; apicibus ramorum fasciculato-comosis. Receptaculum in quoque ramo unicum, cylindricum, mediam partem rami circumvestiens, e paranematibus simplicibus verticalibus dense stipatis constitutum. Sporæ ad paranemata lateraliter affixæ, oblongæ, transversim striatæ.

BELLOTIA *Eriophorum*, Harv.

BELLOTIA Eriophorum, *Harv. in An. Sc. Nat. ser.* 2. *v.* 15. *p.* 332. *Harv. in Hook. fil. Flor. Tasm. cum icone* (*ined.*). *Harv. Alg. Austr. Exsic. n.* 48. *Mont. in Compt. Rendus*, (*v.* 40.) 9 *ap.* 1855.

HAB. Cast ashore from deep water. Port Phillip Heads, *Dr. F. Mueller and W. H. H.* Western Port, abundantly, *W. H. H.* Georgetown, Tasmania, very rare, *R. Gunn, Esq.*, *Charles Henty, Esq.*

GEOGR. DISTR. Bass's Straits, both sides of Channel.

DESCR. *Root* densely clothed with woolly fibres. *Fronds*, many from the same base, 1–2 feet long, twice as thick as hog's-bristle, terete, nearly equal in diameter throughout, twice or thrice umbellately decompound. *Umbels* with twenty to thirty rays or more, young rays being successively evolved from the end of the axis or base of umbel; each ray 2–4 inches long, spreading, tomentose at its base, afterwards quite naked and smooth to the summit, which is crowned with a very dense, globular, penicillate tuft of slender articulate filaments, from ½–¾ of an inch in diameter. These tufts are so dense, that when expanded with water they hold it like a sponge; the filaments of which they are composed are of byssoid fineness, and very flaccid; on old branches they are found in various stages of decay, and at length fall off, leaving a callosity from which a new umbel of rays may spring. The *receptacle* of the fruit is formed in the middle portion of each fertile branch; it is 1–2 inches long, and from half a line to nearly a line in diameter, being twice or thrice that of the barren branch: it consists of densely packed, vertical, simple, articulate paranemata, whorled round the branch, being formed by the evolution of the cortical cells. Each paranema bears several linear-oblong, sessile, blunt *spores*, one at nearly every joint; these are at first pellucid, but afterwards filled with dense endochrome. The *substance* of stem and branches is rigid and wiry. The colour is a very dark olive-brown, greener (but sometimes foxy) in the terminal balls.

* * *

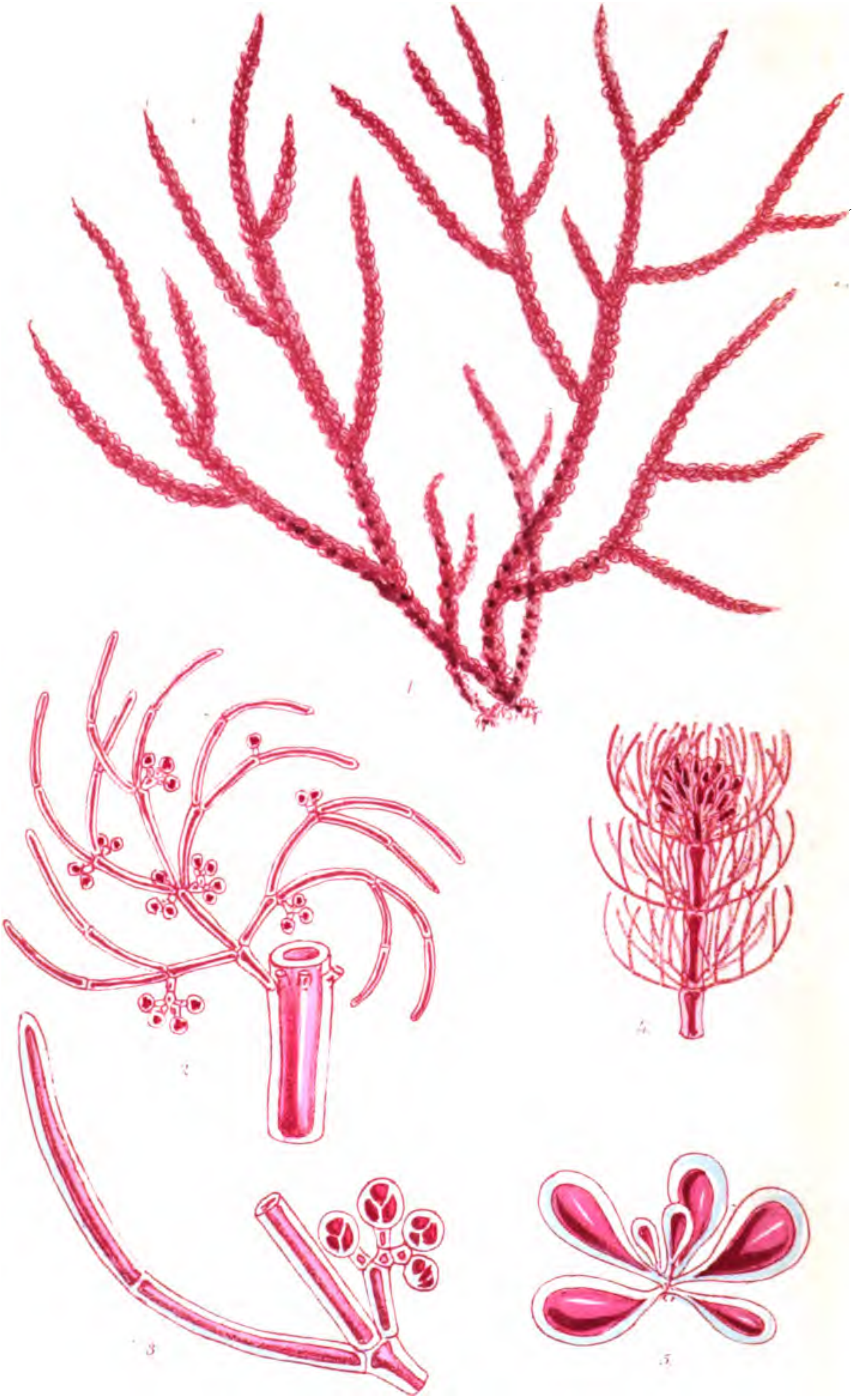
In our last number, when speaking of *Encyothalia Cliftoni* (Pl. LXII.), the very singular Alga which we now figure was alluded to. Who was its earliest discoverer is uncertain. The first specimens I saw were shown to me by Dr. Mueller; but I afterwards found in Mr. Gunn's herbarium some old scraps picked up at Georgetown, where also Mr. Henty has dredged fine specimens. The most prolific habitat, however, as yet known, is Western Port, where, about Christmas, 1854, it was cast ashore, after a storm, in considerable quantity. The appearance, when a large tuft is freshly thrown up, is singular; the stiff wiry stems and branches standing out, each tipped with a round ball of *woolly* hairs; and the Colonial name "*Tagrag and bobtail*" is not without appropriateness. The English botanist will however be reminded of the *Eriophorum*, or Cotton-Grass, of our mountains and bogs, the resemblance to which is very considerable, and if the colour of the balls were white, would be complete.

It is needless to contrast this most distinctly characterized genus with any other. Its nearest known ally is *Encyothalia*, and a comparison of the figure now given with that just referred to, will show that these plants could not well be placed in the same genus, if the principles received among algologists be adhered to.

The present Alga, besides its intrinsic interest, will always have a special claim on the attention of the collector, from its recalling the name of BELLOT, so nobly associated with the search after FRANKLIN.

Fig. 1. An umbellate branch of BELLOTIA ERIOPHORUM,—*the natural size.* 2. Cross section of a receptacle. 3. Paranemata, with spores from the same:—the latter figures *magnified.*

Plate LI



Vincent Brooks Imp.

Ser. RHODOSPERMEÆ. Fam. *Wrangeliaceæ.*

PLATE LXX.

WRANGELIA HALURUS, *Harv.*

GEN. CHAR. *Frond* filiform, decompound, articulated, one-tubed; the internodes naked or coated with minute cellules; the nodes clothed with opposite or whorled, articulated ramelli. *Fructification:* 1, *cystocarps* terminating short branches, involucrated by the uppermost whorled ramelli, and consisting of tufts of pear-shaped, pedicellate *spores* and slender *paranemata;* 2, naked, triangularly parted *tetraspores,* borne on the sides of the whorled ramelli.—WRANGELIA (*Ag.*), in honour of Baron Wrangel, a Swedish naturalist.

Frons filiformis, decomposita, articulata, monosiphonia, nuda v. cellulis corticata, verticillis ramellorum ad genicula onusta. Fruct.: 1, *cystocarpia ramos terminantia, ramellis supremis involucrata, fasciculis numerosis sporarum pyriformium pedicellatarum et paranematibus tenuibus constantia;* 2, *tetrasporæ nudæ, triangule divisæ, ad ramellos sessiles.*

WRANGELIA *Halurus;* frond flaccid, membranaceo-gelatinous, pellucidly articulate, irregularly branched; branches patent, subsimple, tapering, whorled at each joint with di-trichotomous, incurved, imbricated ramelli; axils rounded; articulations of the stem 3–4 times, of the ramelli cylindrical, 10–12 times as long as broad, the terminal cell obtuse; cystocarps terminating short branches; tetraspores pedicellate, clustered round the joints of the ramelli.

W. Halurus; *fronde flaccida molli pellucide articulata vage ramosa; ramis patentibus simpliciusculis attenuatis per totam longitudinem ramellis incurvis di-trichotomis imbricantibus verticillatis; axillis ramorum rotundatis; articulis ramorum* 3–4-*plo ramellorum cylindraceis* 10–12-*plo diametro longioribus, cellula ultima obtusa; cystocarpiis ramos abbreviatos terminantibus; tetrasporis pedicellatis ad genicula ramellorum fasciculatis.*

WRANGELIA Halurus, *Harv. Alg. Austr. Exsic. n.* 262.

HAB. On the stems of the larger Algæ, and on *Cymodocea antarctica:* Fremantle, and Rottnest, and King George's Sound, *W. H. H. and G. Clifton.* Port Fairy, Port Phillip, and Western Port, Victoria, *W. H. H.*

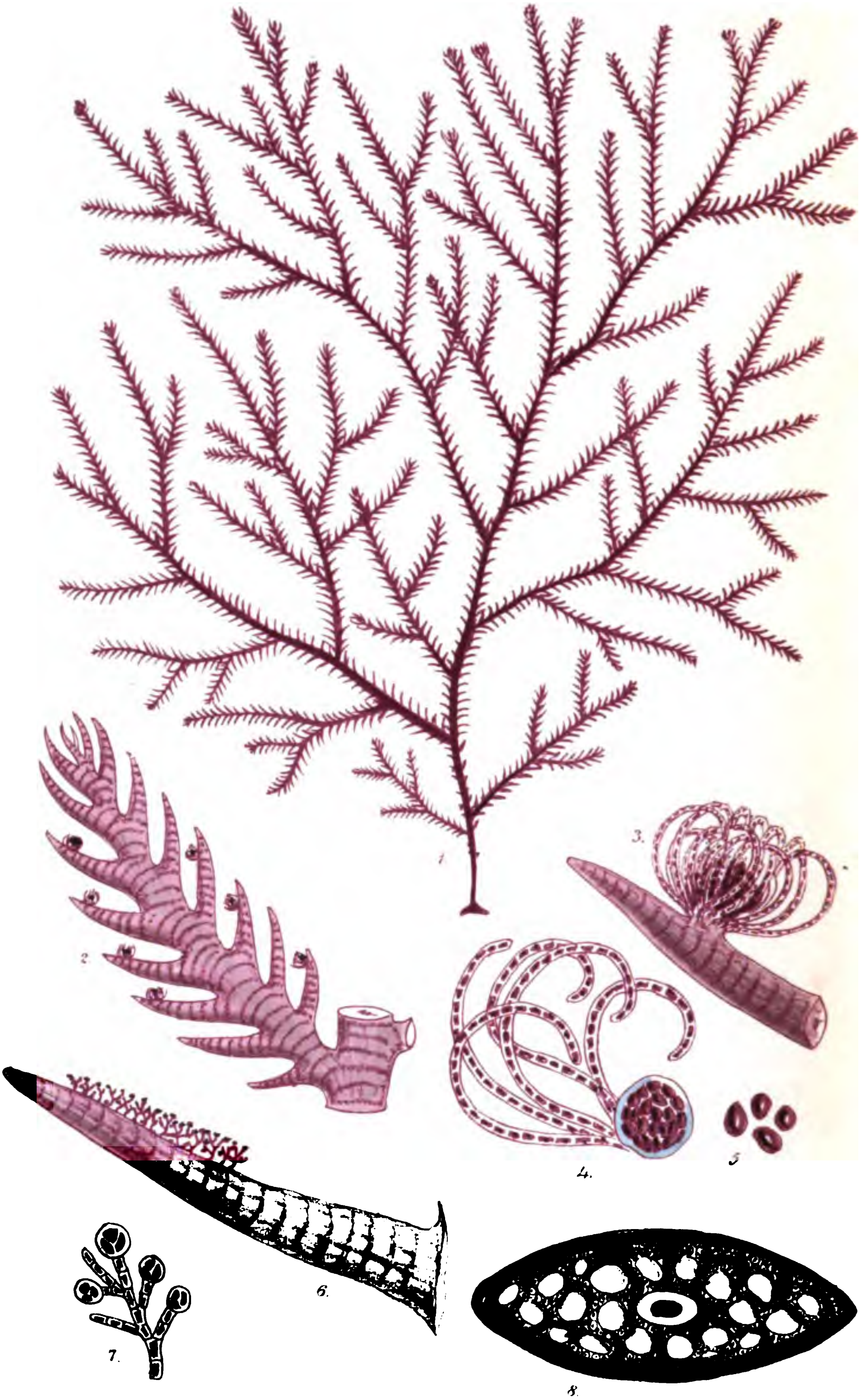
GEOGR. DISTR. West and south coasts of Australia.

DESCR. *Fronds* originating in decumbent or creeping surculi, which lie along the plant to which this Alga attaches itself, and are affixed by clasping discs. *Stems* three to six inches or more in height, sparingly and very irregularly branched; the *branches* alternate, secund, or subopposite or forked, usually simple, worm-like, curved, tapering to a slender point, articulated throughout, and bare of cortical cellules, every articulation crowned with a whorl of ramelli. *Ramelli* one or two lines long, erecto-patent, incurved, the whorls so close as to imbricate each other; each ramellus trichotomous or irregularly dichotomous, composed of slender cylindrical cellules, many times longer than their diameter, the terminal cell being perfectly obtuse. The *articulations* of the stem are 3–4 times as long as broad, but vary in different specimens and parts; they are always pellucidly bordered, with a narrow endochrome and wide dissepiments. The *cystocarps* are wholly composed of clusters of pyriform, wide-margined *spores*, destitute of paranemata, but surrounded by whorled ramelli. The *tetraspores* are spherical, and form pedicellate clusters at the joints of the ramelli. The *colour* when quite recent is rose-red, but of a very fugitive quality, and the plant turns a pale brownish-red, or ochraceous, in the herbarium. The *substance* is very soft and tender, soon decomposing in fresh-water; and the plant, in drying, adheres most closely to paper.

At a first glance, the Alga here figured bears a striking resemblance to the well-known British species *Halurus equisetifolius*, a resemblance hinted at in the specific name. The substance, however, is very much softer, and the whole frond quickly breaks up and melts to jelly when put into fresh-water; the colour also is paler and more fugacious, and the fructification quite different. The present is a genuine *Wrangelia*, a genus which has many beautiful species in Australia, where it appears to reach its maximum of development, both as to number and size. These several species exhibit considerable variety of aspect, while agreeing in fruit and in essential character. Some resemble *Callithamnia*, others *Dasyæ*, others *Spyridiæ*, others *Griffithsiæ* and *Haluri*; it is difficult therefore to say which should be regarded as the central groups. As this work proceeds we shall figure the more remarkable, omitting those already figured in the 'Flora Tasmanica.'

Fig. 1. WRANGELIA HALURUS,—*the natural size.* 2. A joint bearing a *ramellus*, with *tetraspores*. 3. Portion of the same. 4. Short branch, with whorled ramelli and a cystocarp. 4. Tuft of spores from the cystocarps:—the latter figures variously *magnified*.

Plate LIII.



Vincent Brooks Imp.

PLATE LXXI.

PTILOTA STRIATA, *Harv.*

GEN. CHAR. *Frond* compressed or two-edged, distichous, pectinato-pinnate, inarticulate, with an articulate monosiphonous axis; the pinnules sometimes articulate. *Fructification:* 1, involucrate *favellæ*, containing numerous angular spores; 2, *tetraspores* attached to the pinnules, sessile or stalked, solitary or glomerulate, tripartite.—PTILOTA (*Ag.*), from *πτιλωτος*, *pinnated.*

> *Frons compressa v. anceps, disticha, pectinato-pinnata, corticata, axi articulato monosiphonio percursa; pinnulis sæpius corticatis, nunc pellucide articulatis. Fruct.:* 1, *favellæ involucratæ sporas numerosas angulatas foventes;* 2, *tetrasporæ ad pinnulas sessiles v. pedicellatæ, sparsæ v. glomerulatæ, triangule divisæ.*

PTILOTA *striata;* frond slender, two-edged, alternately decompound; branches and their divisions subdistant, rod-like, transversely rugulose, closely pectinato-pinnate; pinnules alternate, subulate, inarticulate, transversely striate; favellæ borne on the inner edge of the pinnules, below the apex; the involucre formed of many slender, involute, articulated filaments; tetraspores on branching, confervoid pedicels, developed along the edges of the pinnules.

> P. striata; *fronde angusta ancipiti alterne pluries decomposita; ramis majoribus minoribusque sparsis virgatis transversim rugulosis crebre pectinato-pinnatis; pinnulis alternis subulatis inarticulatis transversim striatis; favellis ad marginem superiorem pinnularum infra apicem sessilibus; involucro ex filis numerosissimis articulatis involventibus formato; tetrasporarum pedicellis ramosis articulatis ad margines pinnularum evolutis.*

PTILOTA striata, *Harv. Alg. Austr. Exsic. n.* 477.

HAB. Cast ashore from deep water, Rottnest Island, near Fremantle, *W. H. H.*

GEOGR. DIST. Western Australia.

DESCR. *Root* a large, flattened disc, quarter to half an inch in diameter. *Fronds* tufted or solitary, 6–12 inches long, and as much in the spread of the branches, half a line in breadth, compressed and sharply two-edged, decompoundly branched in an irregularly alternate manner, the general outline being somewhat flabelliform and fastigiate. *Branches* three or four times alternately decompound, the divisions erecto-patent, issuing at acute angles, subdistant, of unequal lengths, and unequally compound. All the branches and their divisions are closely pinnulated with minute, alternate, subulate pinnules, one to two lines in length. Under a pocket-lens the branches and their divisions appear transversely furrowed at distances of about half the diameter, and the pinnules are more finely striate in a similar way; these cross lines are indications of the internal, articulated axis, and disappear when the surface is highly magnified; they are also more obvious in the dried, than in the living specimens. The *favellæ* are very minute, sessile near the tips of the pinnules, and surrounded by confervoid, articulated, strongly involute filaments. The *tetraspores* are borne on the ends of the branches of minute confervoid filaments, a fourth of a line in length, which issue from either edge of the pinnules, sometimes from both edges. The *colour* is a dark vinous-red, becoming browner in dying. The *substance* is cartilaginous, and the frond imperfectly adheres to paper in drying.

As already remarked under *Dasyphila Preissii* (Pl. LXVI.), this plant shows characters intermediate between *Ptilota* and *Dasyphila*, proving the close connection between these genera. From all other *Ptilotæ* (perhaps excepting *P. siliculosa,* whose cystocarps are not known) the present differs in the position of its cystocarps, and the development of their involucre. In other species (as in *Pt. Rhodocallis,* Plate XLIV.) the cystocarp terminates a shortened *branch* of the frond, and the involucre is formed of displaced or rather fasciculated *ramuli ;* here the cystocarp proceeds from the side of a *ramulus,* and the involucre is a special confervoid emanation of the same. This character certainly indicates a difference of type, and if it applied to many species, or if *Ptilota* should become an inconveniently large assemblage, it might be made available for generic distinction. Distinctions also exist in the cellular structure of the frond; but if these were strictly attended to they would break up the present *Ptilota* into several.

The present species is easily recognized, with a common pocket-lens, by the transverse furrows and ridges that mark all the branches and ramuli, and which are indications of the internal jointed main axis and the surrounding lesser axis. When quite fresh, it bears much resemblance to *Phacelocarpus Billardieri,* but does not become scarlet, like that species, on exposure to rain or steeping in fresh-water.

Fig. 1. Ptilota striata,—*the natural size.* 2. A small branch, bearing *favellæ* on its pinnules. 3. Apex of a pinnule, with an involucrated favella. 4. The *favella,* with a portion of the involucre removed. 5. Spores. 6. A pinnule, bearing marginal confervoid filaments, with tetraspores. 7. One of the fertile filaments. 8. Transverse section of the frond:—the latter figures variously *magnified.*

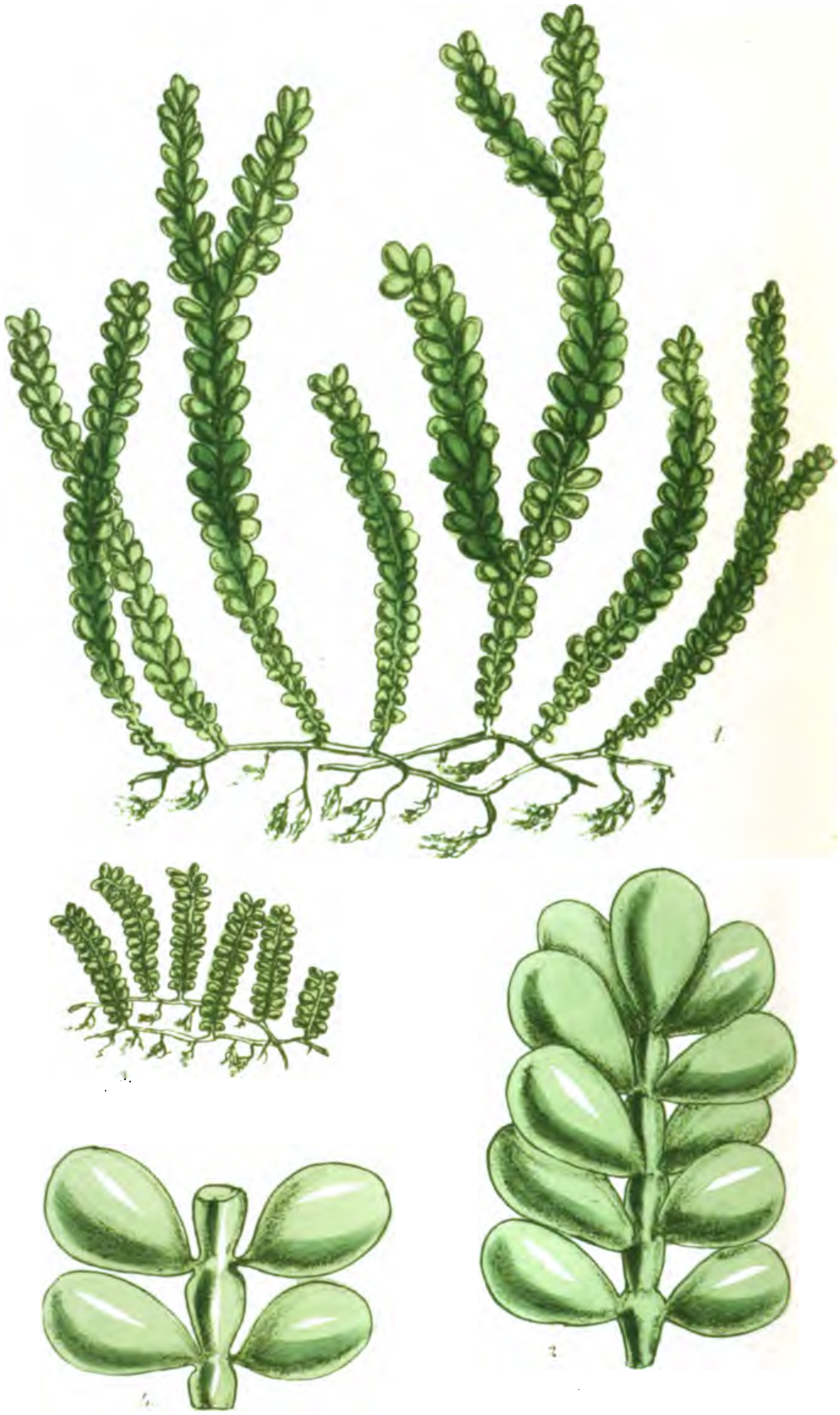

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PLATE LXXII.

CAULERPA SEDOIDES, *Ag.*

GEN. CHAR. *Frond* consisting of prostrate *surculi* rooting from their lower surface, and throwing up erect branches (or secondary fronds) of various shapes. *Substance* horny-membranous, destitute of calcareous matter. *Structure* unicellular, the cell (*frond*) continuous, strengthened internally by a spongy network of anastomosing filaments, and filled with semifluid grumous matter. *Fructification* unknown.—CAULERPA (*Lamour.*); from *καυλος, a stem,* and *ἑρπω, to creep.* The creeping surculi are characteristic of this genus.

Frons ex surculis prostratis hic illic radicantibus et ramis erectis polymorphis formata. Substantia corneo-membranacea. Structura unicellulosa, cellulæ membrana continua hyalina intus filis cartilagineis tenuissimis anastomosantibus firmata et endochromate denso viridi repleta. Fr. ignota.

CAULERPA *sedoides;* surculus slender, glabrous; fronds erect, sessile, simple or branched, laxly set with opposite or quadrifarious, saccate, obovoid ramenta; rachis somewhat constricted at short intervals.

C. sedoides; *surculo tenui glabro; fronde erecta sessili simplici v. ramosa ramentis oppositis v. undique insertis saccatis obovoideis laxe obsessa; rachide inter ramenta nodoso-constricta.*

CAULERPA sedoides, *Ag. Sp. Alg. v.* 1. *p.* 438; *Syst. p.* 182. *Endl.* 3*rd Suppl. p.* 16. *Hook. et Harv. Fl. N. Zeal. v.* 2. *p.* 261.

CHAUVINIA sedoides, *Kütz. Sp. Alg. p.* 498.

AHNFELDTIA sedoides, *Trev. in Linn. v.* 22. *p.* 143.

FUCUS sedoides, *Turn. Hist. Fuc. t.* 172.

Var. *β. geminata;* ramenta regularly distichous and opposite, the rachis articulato-constricted.

Var. *β.* geminata; *ramentis distichis oppositisque, rachide articulato-constricta.*

CAULERPA geminata, *Harv. in Trans. R. I. Acad. v.* 22. *p.* 564.

HAB. On rocks near low-water mark: generally distributed from Swan River to Port Phillip; and at Kiama, New South Wales. Tasmania. *Various collectors.*

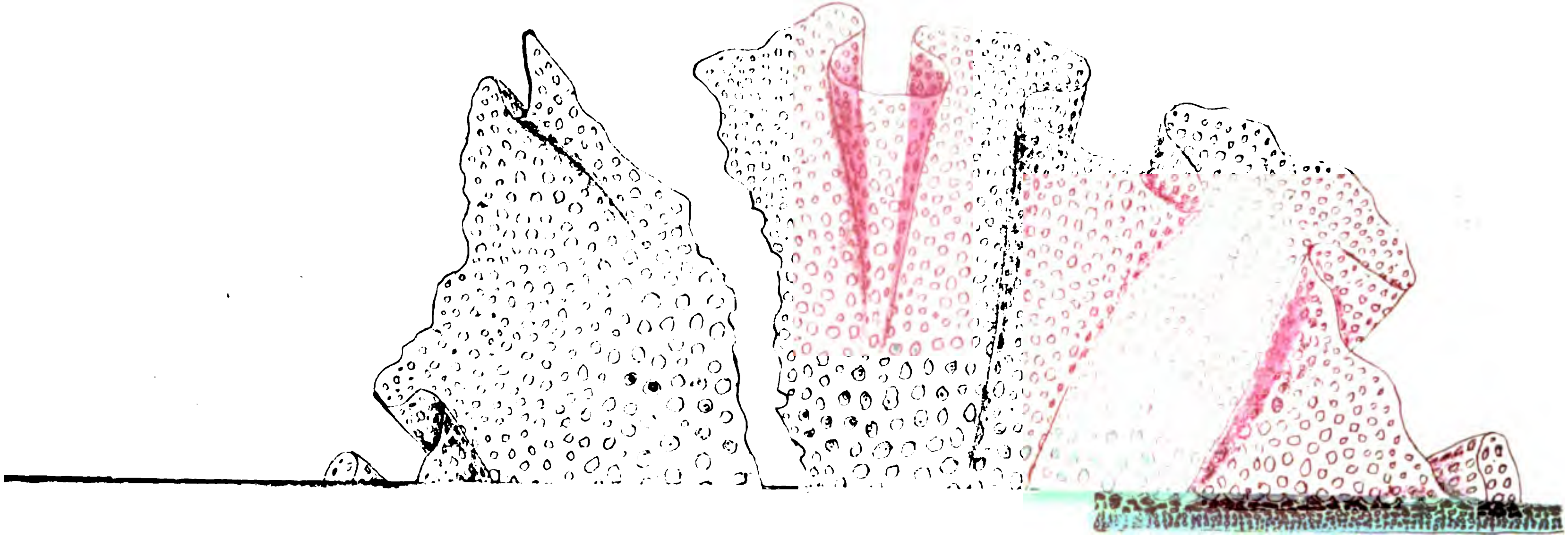
GEOGR. DISTR. West, south, and east coasts of Australia (probably all round the coast). New Zealand. Mauritius. Indian Ocean.

DESCR. *Surculi* extensively creeping, rooting at short intervals, and forming a dense mat, glabrous and glossy, several inches long, and varying from half a line to nearly a line in diameter, shrinking and becoming wrinkled in drying. *Fronds* crowded, 2–4 or occasionally 6 inches long, linear, clothed throughout their whole length with laxly imbricated leaves, which are sometimes perfectly distichous and opposite, sometimes irregularly inserted on all sides, and more crowded: the normal insertion however is seemingly distichous and opposite, for the rachis is regularly constricted into spurious nodes between each pair of leaves or ramenta. These *ramenta* are obovoid, one or two lines long, and more than half as broad as their length. The *colour* is a brilliant yellow-green, well preserved in drying; fading, in old fronds, to a dull straw-colour. The *substance* is cartilaginous, and the plant, if quite fresh and well pressed, will adhere, though not firmly, to paper.

A pretty little species of *Caulerpa,* more widely dispersed than most of the Australian kinds, and subject to considerable variation in size and in the disposition of the ramenta. Our var. β, in its typical state, looks so unlike the common form, that I at first took it for a distinct species; but specimens subsequently obtained showed a complete passage into the ordinary *C. sedoides.* All authors agree in describing the ramenta as imbricated on all sides, and so they apparently are in many cases, but I think this arises more from twisting of the rachis, or displacement of the ramenta, than from regular development; for it is equally or more common to find strictly distichous opposite ramuli; and the *regular* constriction of the compressed rachis below their insertion indicates that these are normally distichous. The development of the whole frond is very similar to that of *C. cactoides,* which this species resembles in miniature. The specific name "*sedoides*" alludes to the resemblance to *Sedum dasyphyllum.*

Fig. 1. CAULERPA SEDOIDES,—*the natural size.* 2. Small portion,—*magnified.* 3. C. SEDOIDES, var. GEMINATA,—*the natural size.* 4. Small portion,—*magnified.*

Plate LXXIII.



Vincent Brooks, Imp.

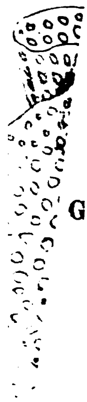


Plate LXXIII.

KALLYMENIA CRIBROSA, *Harv.*

Gen. Char. *Frond* carnoso-membranaceous, flat, of irregular shape, composed of three strata; the *medullary* stratum of interwoven and anastomosing filaments; the *intermediate* of large, roundish cells; the *cortical* of minute, vertically seriated cellules. *Fructification:* 1, *cystocarps* sunk in the frond, but prominent to one or both surfaces, containing a compound nucleus, formed of several nucleoli or masses of spores; 2, cruciate *tetraspores,* scattered among the cortical cellules.—Kallymenia (*J. Ag.*), from καλλις, *beautiful,* and ὑμην, *a membrane.*

Frons carnoso-membranacea, plana, amorpha, stratis tribus contexta. Stratum medullare ex filis intertextis anastomosantibus; intermedium ex cellulis magnis rotundato-angulatis; corticale cellulis minimis coloratis verticaliter seriatis. Fruct.: 1, *cystocarpia frondi immersa, nucleolis pluribus composita;* 2, *tetrasporæ cruciatim divisæ, sparsæ.*

Kallymenia *cribrosa;* stipes short, expanding into a very broad, simple or bipartite, roundish reniform frond, cordate at base, and regularly pierced with closely set circular holes, which are small toward the margin, and larger towards the centre of the frond; cystocarps scattered over the surface.

K. cribrosa; *stipite brevi in frondem maximam simplicem vel bipartitam rotundato-reniformem basi-cordatam foraminibus circularibus crebris versus marginem minoribus pertusam ampliato.*

Kallymenia cribrosa, *Harv. Trans. R. I. Acad. v.* 22. *p.* 555; *Alg. Austr. Exsic. n.* 417.

Hab. Cast ashore from deep water. Fremantle, West Australia, *George Clifton.* King George's Sound, and Port Phillip Heads, *W. H. H.* Georgetown, Tasmania, *Rev. I. Fereday.* East coast of Tasmania, *R. Gunn.* Annual.

Geogr. Distr. West and south coast of Australia. Tasmania.

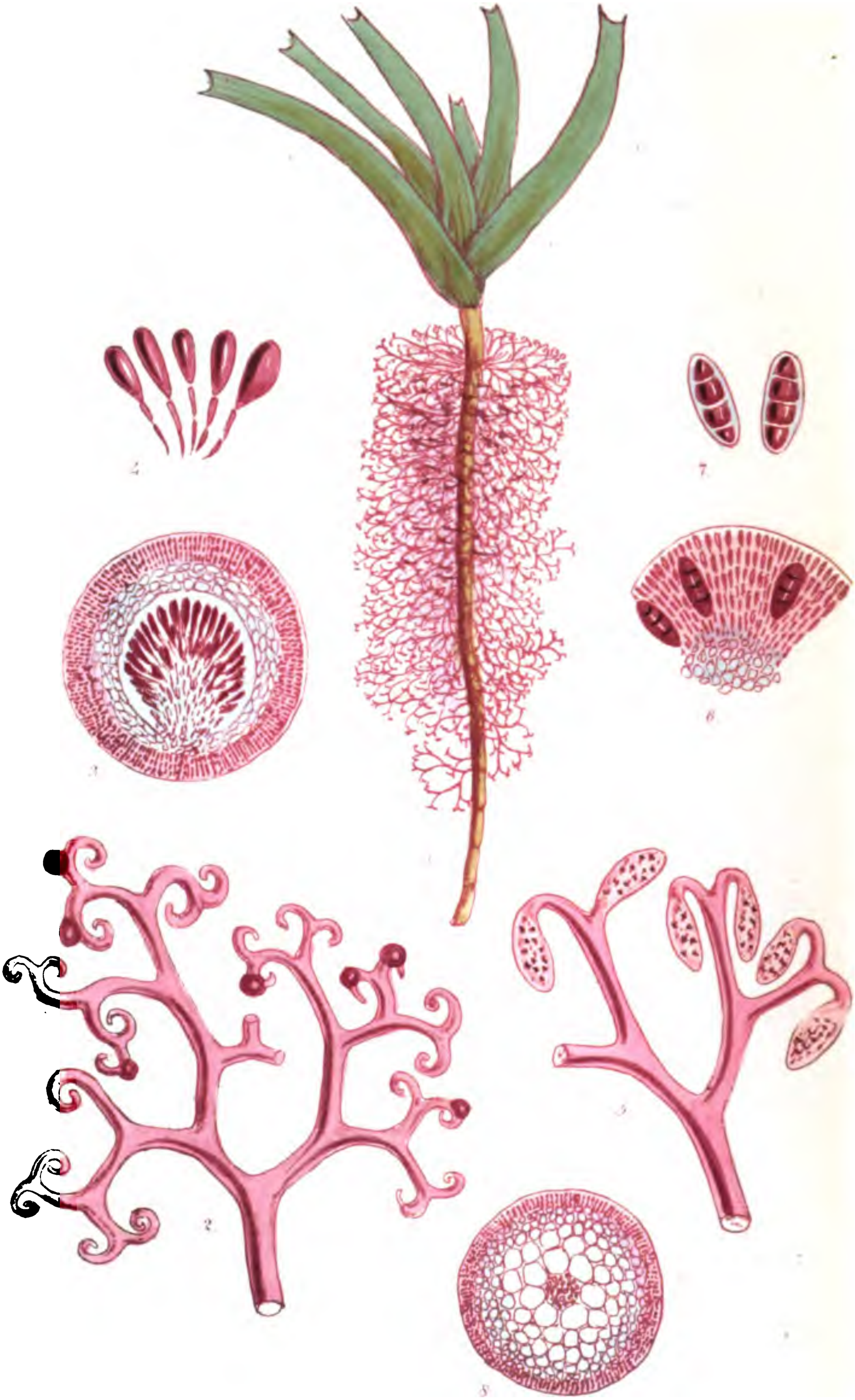
Descr. *Root* a flat disc, quarter inch in diameter. *Stipes* $\frac{1}{4}$–$\frac{1}{2}$ inch long, plano-compressed, suddenly expanding into a *lamina* from a foot to two feet in length and breadth, or twice as broad as its length, cordate at base, with a roundish reniform outline, but scarcely two specimens of the same shape, either quite entire or deeply cloven in the middle, or divided nearly to the base into two roundish lobes; the margin quite entire, but wavy, and more or less plaited. Sometimes, from casual laceration and proliferous aftergrowth, the outline becomes more lobed. At all ages the *frond* is pierced with holes; but they vary in dimensions according to the age, either of the specimens, or portion of specimen. In the very young frond, and in the expanding margins, the holes are very minute, resembling pin-punctures; gradually they increase in size until they attain from $\frac{1}{8}$—$\frac{1}{4}$ inch in diameter, and always preserve a tolerably regular circular outline. No holes are found in the region just above the stipes, a portion of the lamina which continues to develope during the active life of the plant. The *cystocarps* are minute, dot-like, dark-red, and much sunk in the substance of the frond, through which they are plentifully scattered. The *filaments* of the medullary region are rather laxly interwoven, and those of the intermediate are of smaller size than common in the genus, and in a single row. The *colour* when quite fresh is a deep crimson-lake; from which it passes through all grades of rose-red to yellowish and white. The *substance* is gelatinous and tender, and the plant, in drying, adheres strongly to paper.

* * *

The genus *Kallymenia*, founded on the old "*Fucus reniformis*" of Turner, now includes several species, inhabiting widely separated localities, extending from the circumpolar ocean of the north, to the shores of Tierra del Fuego and New Zealand on the south. But among all that it comprises, there is none comparable in beauty to the species now figured; nor are there many Algæ, even in Australia, that match this one for delicacy of colour and singularity of structure. The outline is not remarkable. It is like its congeners, merely a shapeless expansion. But the regularity with which every portion of the substance becomes pierced with gradually enlarging holes, soon converts the shapeless frond into a delicate piece of open-work, fit for a mermaid's mantle on her gala days. Its Colonial name —"the *holy coat*," by which it is known to collectors of seaweeds—is grotesquely true. It cannot be doubted that the tendency to form holes regularly throughout the membrane, is a normal condition of the species, analogous to the same tendency seen in Algæ of very different affinity, as *Agarum* and *Thallassiophyllum*, *Hydroclathrus* and *Ulva reticulata*. The only portion which remains constantly free from holes is a small space at the base. Specimens from the several localities where it occurs,—localities separated by many hundred miles,—are precisely similar. Its most abundant known habitat is in the eddy just within the Heads of Port Phillip. In the other known habitats it is very rare.

Fig. 1. KALLYMENIA CRIBROSA,—*the natural size.* 2. Section of the frond and of a *cystocarp*,—*magnified.*

Plate XLIV



Vincent Brooks Imp.

PLATE LXXIV.

DICRANEMA REVOLUTUM, *J. Ag.*

GEN. CHAR. *Frond* terete, dichotomous, formed of three strata; the *medullary* stratum of slender, closely packed, longitudinal filaments; the *intermediate* of angular cells, smaller towards the circumference, and the *cortical* of vertically seriated, minute, coloured cellules. *Fructification:* 1, hemispherical *conceptacles,* containing within a thick pericarp, pedicellate, obovate spores attached to a parietal fibro-cellular placenta (formed from the medullary stratum); 2, zonate *tetraspores,* lodged in the swollen (pod-like) tips of the branches.—DICRANEMA (*Sond.*), from *δικρανον, a fork,* and *νημα, a thread.*

Frons teretiuscula, dichotoma, stratis tribus contexta. Stratum medullare ex filis longitudinalibus tenuibus densis; intermedium cellulis rotundato-angulatis, exterioribus minoribus; corticale cellulis minimis coloratis verticaliter seriatis. Fruct.: 1, cystocarpia hemisphærica intra pericarpium crassum sporas obovatas pedicellatas ad placentam parietalem fibro-cellulosam foventia; 2, tetraspora zonatim divisæ, in apicibus tumidis (siliquæformibus) ramorum nidulantes.

DICRANEMA *revolutum;* frond (an inch long) setaceous, dichotomo-fastigiate; axils widely spreading; apices strongly revolute; conceptacles remote from the horn-like tip; pod-like tips of tetraspores reflexed.

D. revolutum; ***fronde (unciali) setacea dichotomo-fastigiata; axillis patentissimis; apicibus revolutis; conceptaculis ab apice remotiusculis, apicibus siliquæformibus reflexis.***

DICRANEMA revolutum, *J. Ag. Sp. Alg. v.* 2. *p.* 634. *Harv. in Trans. R. I. Acad. v.* 22. *p.* 549; *Alg. Austr. Exsic. n.* 314.

SPHÆROCOCCUS revolutus, *Ag. Sp. p.* 334.

HAB. Shores of New Holland, *Gaudichaud.* At Cape Riche, Western Australia, *W. H. H.*

GEOGR. DISTR. West and south coasts of Australia.

DESCR. *Root* a minute disc. *Fronds* densely tufted, from an inch to 1–1½ inches high, scarcely as thick as hog's-bristle, several times forked with considerable regularity; sometimes, from suppression of one of the forks, irregularly cymose. All the divisions are remarkably patent, the *branches* spreading often at right- or nearly right-angles. The tips of every segment curl backwards into a hook. The *conceptacles* are borne near the ends of the branches, at about the base of the hooked apex, which is prolonged like a horn, at least thrice the diameter of the conceptacles. The *pericarp* is formed from the intermediate and cortical layers of the frond; the *placenta* from the medullary. The latter adheres to one side of the pericarp, and bears from all parts of its surface, pedicellate, obovate spores, rather densely set, and deeply coloured. The *tetraspores* are lodged among the cortical cellules of swollen, pod-like tips of the branches, these tips hooking backwards: they are less common than the conceptacles. The *colour* is a dark brownish-red, preserved in drying. The *substance* is rigid, somewhat horny when dry, and the plant does not adhere to paper.

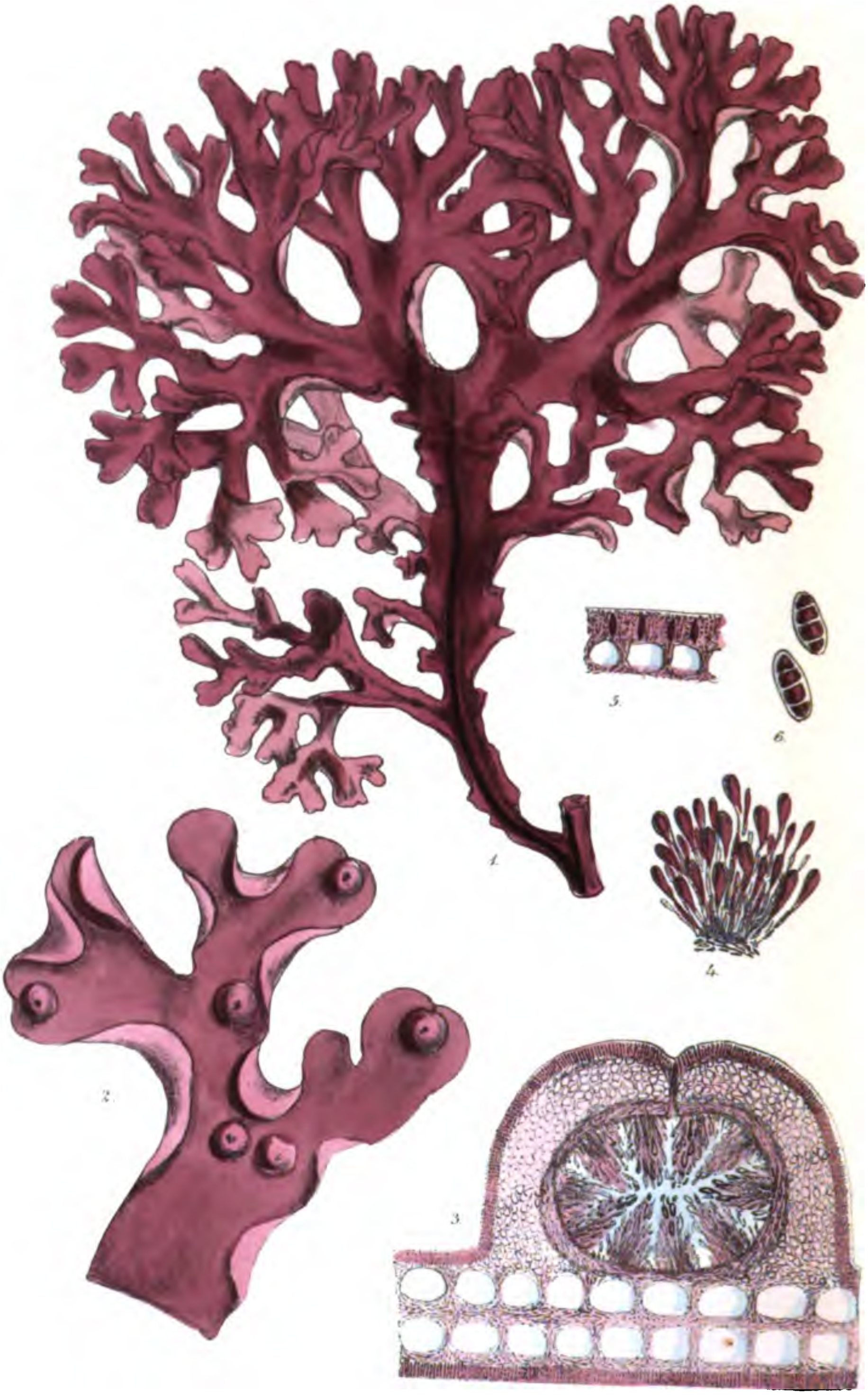
A curious little plant, first found by *Gaudichaud;* but by me only met with in the locality above noted, close to Mr. Cheyne's hospitable house at Cape Riche. There it occurred in February, 1854, in great profusion, thickly covering the stems of *Cymodocea antarctica,* at low-water mark; and among the hundreds of specimens which I collected, there was no valid variation in size or form, and no tendency to pass into *D. Grevillii.* I am therefore disposed to consider the present a distinct species.

Agardh places the genus *Dicranema* in the Fam. *Sphærococcoideæ,* near *Dicurella,*—and as far as habit goes, there is much resemblance between these genera. But to me the *parietal fibro-cellular placenta,* derived from the medullary layer, together with the form of the spores, and the shortness of the spore-threads, and the position of the zonate tetraspores in terminal pods, point rather to an affinity with *Gelidiaceæ,* where therefore I place the genus. The structure of its conceptacles is analogous to that of *Pterocladia;* that of the frond is not very different from that of *Hypnea.*

At present *Dicranema* includes three species, *D. revolutum, D. Grevillii,* and *D. filiforme.* The "*D. pusillum*" of my Austr. Algæ, n. 313, on more careful re-examination, proves to be a species of *Mychodea.*

Fig. 1. A tuft of DICRANEMA REVOLUTUM, growing on the stems of *Cymadocea antarctica,*—*the natural size.* 2. Portion of a frond, with *conceptacles* below the tips. 3. Cross section of a conceptacle. 4. Spores from the same. 5. Portion of a frond with pod-like tips containing tetraspores. 6. Section of the cortical layer of a swollen tip, showing the tetraspores *in situ.* 7. Tetraspores. 8. Cross section of the frond:—all but the first figure more or less *magnified.*

Plate LXIV.



Vincent Brooks, Imp.

PLATE LXXV.

HENNEDYA CRISPA, *Harv.*

GEN. CHAR. *Stem* terete, branched; branches dilating upwards into a flat, dichotomous, membranous frond, composed of three strata; the *medullary* stratum of very slender, anastomosing, densely interwoven filaments; the *intermediate* of large empty cells, in a single row; the *cortical* of minute, coloured, vertically seriated cellules. *Fructification:* 1, hemispherical, umbilicated *conceptacles*, with a terminal pore, sessile near the tips of the segments, containing tufts of pedicellate, subpyriform spores attached to numerous, parietal placentæ; 2, zonate *tetraspores*, in sori, beneath the tips of the segments.—HENNEDYA (*Harv.*), in honour of Roger Hennedy, of Glasgow, an able microscopist and successful explorer of the Algæ of Scotland.

Stipes teres, ramosus; rami sapice in frondem planam membranaceam dichotomam stratis tribus contextam dilatatis. Stratum medullare ex filis tenuissimis anastomosantibus densissime intertextis; intermedium cellulis magnis vacuis uniseriatis; corticale cellulis minimis verticaliter ordinatis contextum. Fruct.: 1, *cystocarpia hemisphærica, elevata, umbilicata, demum poro pertusa, ad apices laciniarum sessilia, fasciculos sporarum secus parietes loculi dispositos foventia;* 2, *tetrasporæ zonatim divisæ, in soris infra apices laciniarum aggregatæ.*

HENNEDYA *crispa*, Harv.

HENNEDYA crispa, *Harv. in Trans. R. I. Acad. v.* 22. *p.* 552. *Alg. Austr. Exsic. n.* 331.

HAB. Cast ashore from deep water. Rottnest Island, *W. H. H.* Fremantle, *George Clifton.*

GEOGR. DISTR. West coasts of Australia.

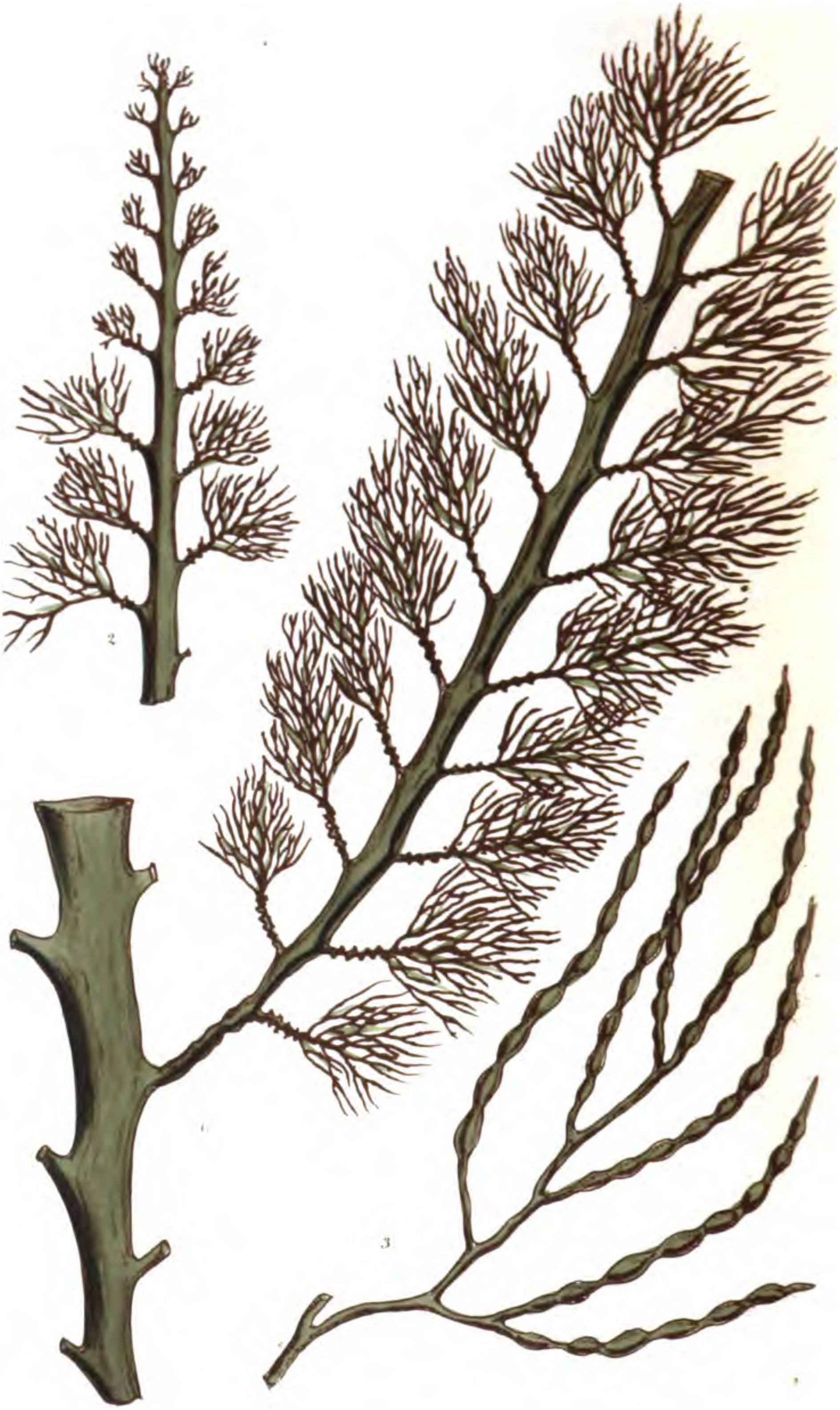
DESCR. *Root* a large, hard disc. *Fronds* 6–12 inches high; *stem* hard and woody, terete or compressed, 1–2 inches long, dividing into several branches. *Branches* soon compressed, then flattened, and passing into the base of a dichotomo-multifid, flabelliform, fastigiate, thinly membranous lamina, whose lowermost and principal segment is traversed by a vanishing midrib, being the prolonged apex of the terete branch. The segments of the lamina vary in breadth from ¼–½ or ¾ inch; they are linear or slightly cuneate, with remarkably rounded axils, and very blunt but generally emarginate apices. The whole frond is remarkably curled and undulated. The *conceptacles* are generally solitary, sessile exactly at the emarginate tip of the segment, but are sometimes two together and somewhat removed from the tip: they are hemispherical, dimpled in the middle, and finally pierced by a pore, through which the spores escape. The *pericarp* is very thick, formed of the three strata of the frond, its cavity being hollowed out in the middle of the medullary stratum. The tufts of spores are very numerous, and spring from all parts of the walls of the conceptacle. *Tetraspores* are lodged in sori, under the tips of the segments of the frond, and are much less common than the conceptacles. The *colour* is a dark brownish-purple or dull-red, and becomes darker on drying. The *substance* is rigidly membranous, and the plant does not adhere to paper in drying.

I propose the present plant as the type of a new genus, related to *Chætangium*, but differing in having a distinct stem, emitting branches that end in flabelliform fronds, traversed at base by a vanishing rib; and further, by the intermedial stratum of large empty cells, and the more external conceptacles. The latter characters are of greater significance than the former, and suffice alone to mark the genus. The little group of "*Chætangieæ*" retained by Professor Agardh as an Order, have so many characters in common with *Gelidiaceæ*, that I am disposed to unite them (together with the *Hypneaceæ*) to that family. It appears to me undesirable to multiply Families for every minor structural character. The differences between the structure of the conceptacle in *Chætangia* and *Pterocladia* are surely more generic than ordinal.

Hennedya crispa is abundantly thrown up at Rottnest Island, after winter gales, and is then generally found well covered with fruit. The specimens with conceptacular fruit are much the commonest. To the naked eye the plant strongly resembles a *Thysanocladia*, particularly *T. coriacea;* but the ramification is different, not to speak of fruit or structure. It is very apt to be infested with small Zoophytes and Molluscoid Corallines (*Bryozoa*), and to the collector of these diversified and beautiful animalcules its tufts will often afford a rich harvest.

Fig. 1. A branch of HENNEDYA CRISPA,—*the natural size*. 2. Apex of a segment, with *conceptacles* under the tips. 3. Section through the frond, and through a conceptacle. 4. Tuft of spores. 5. Section through a sorus; tetraspores from the same:—the latter figures more or less *magnified*.

Plate LXXVI



Vincent Brooks Imp.

PLATE LXXVI.

CYSTOPHORA SPARTIOIDES, *J. Ag.*

GEN. CHAR. *Root* scutate. *Frond* pinnately decompound, dendroid, with a distinct stem, branches, and ramuliform leaves. *Vesicles* stipitate, simple, rarely absent. *Receptacles* pod-like, torulose or moniliform, developed in the ramuli. *Scaphidia* hermaphrodite. *Spores* obovoid. —CYSTOPHORA (*J. Ag.*), from *κυστις, a bladder*, and *φορεω, to bear.*

Radix scutata. Frons pinnatim decomposita, dendroidea, caule proprio, ramis foliisque ramuliformibus donata. Vesiculæ stipitatæ, simplices, raro deficientes. Receptacula siliquæformia, torulosa v. nodulosa, apice ramulorum evoluta. Scaphidia hermaphrodita.

CYSTOPHORA *spartioides;* stem flat, decompound, pinnate; pinnæ springing from the sharp edge of the stem, erecto-patent; pinnules alternate, compressed, nodulose below, decompound above; the ultimate segments filiform, dichotomo-multifid, ending in slender, moniliform, attenuated receptacles; vesicles none.

C. spartioides; *caule plano decomposito-pinnato; ramis a margine caulis egredientibus erecto-patentibus; pinnulis alternis compressis infra nodulosis nudisque sursum decompositis; laciniis ultimis filiformibus tenuibus dichotomo-paniculatis in receptacula moniliformia longe attenuata abeuntibus; vesiculis nullis.*

CYSTOPHORA spartioides, *J. Ag. Sp. Alg. v.* 1. *p.* 244. *Harv. Alg. Austr. Exsic. n.* 8.

PHYLLOTRICHA spartioides, *Aresch. in Act. Ups. ser.* 3. *v.* 1. *p.* 33.

BLOSSEVILLEA spartioides, *Dne. Kütz. Sp. Alg. p.* 629.

CYSTOSEIRA spartioides, *Ag. Sp. Alg. v.* 1. *p.* 77; *Syst. p.* 294.

FUCUS spartioides, *Turn. Hist. t.* 232.

HAB. Shores of New Holland, *R. Brown.* Port Fairy, *W. H. H.* Georgetown, Tasmania, *R. Gunn.* Derwent, *Mr. Oldfield.*

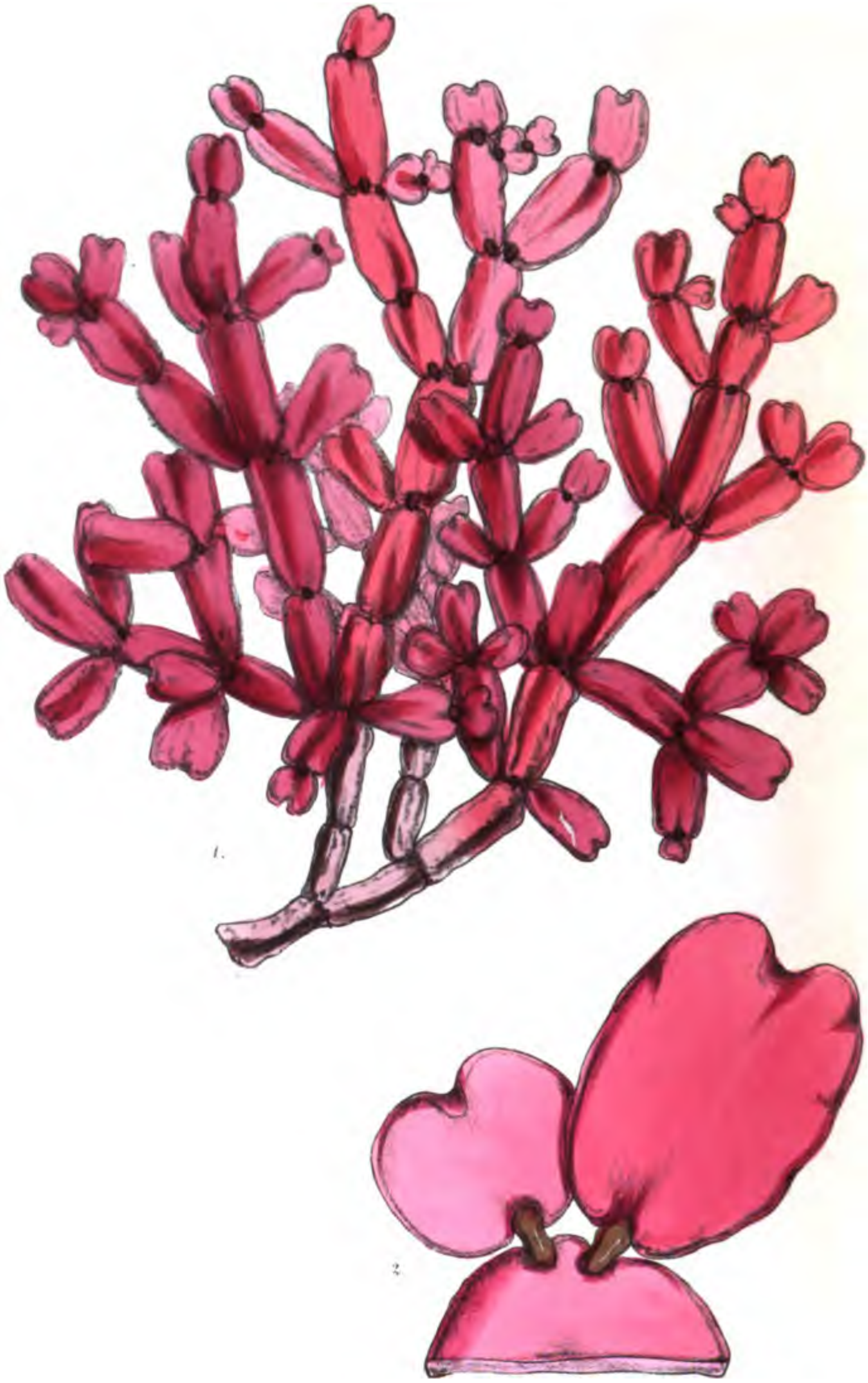
GEOGR. DISTR. South coast of Australia, and Tasmania.

DESCR. *Roots* conical, an inch or more across. *Stems* six feet long or sometimes much more, quite simple, preserving throughout a breadth of nearly half an inch, strongly compressed and two-edged, nearly flat, but somewhat thickened in the middle, set throughout their whole extent, at intervals of about an inch or an inch and a half, with alternate branches or pinnæ. *Pinnæ* springing from the knife-like edge of the stem, spreading, but curved upwards, linear-lanceolate in outline, and from two to three feet in length, plano-compressed like the stem, tapering to each end, nearly a quarter of an inch wide, regularly set with alternate pinnules. *Pinnules* one to two inches long, as thick as packthread at base, naked but warted or spinous in the lower third, thence to the apex closely set with alternate, filiform, setaceous, irregularly dichotomous ramuli. *Vesicles* none. *Receptacles* formed from the scarcely thickened ends of the branchlets, constricted at short intervals, nodoso-moniliform, and tapering to a fine point. *Colour* a very dark olive-brown, turning black in drying. *Substance* coriaceous, rather brittle when dry.

It is impossible in an octavo, or even in a folio plate, to do adequate justice to a gigantic Alga like the present, which can only be seen in its perfect form, stretched out (like Milton's hero) on the sea-shore. I can only show the stump and the tip of one of its long arms; and must refer the student, for its other characters, to the detailed description. Fortunately, there is no species of *Cystophora* with which it can be confounded; for it is the only one that has branches springing from *the edge* (not the *broadside*) of a *flattened* stem. I have never seen vesicles, nor are they described by Turner or Agardh. This species does not occur, so far as I am aware, in West Australia. After passing Cape Northumberland, which seems to mark the western limit of several of the larger Fucoids, it becomes abundant, and continues through Bass's Straits to Tasmania.

Fig. 1. CYSTOPHORA SPARTIOIDES; portion of the stem, with the base of a *pinna*. 2. Apex of a pinna:—both *the natural size*. 3. Portion of one of the ultimate dichotomous ramuli, with beaded *receptacles* formed from the terminal segment,—moderately *magnified*.

Plate LXVII.



Vincent Brooks lit.

PLATE LXXVII.

AMPHIROA AUSTRALIS, *Sond.*

GEN. CHAR. *Frond* terete, compressed, or flat, calcareous, articulated, dichotomous, pinnated or whorled. *Nodes* cartilaginous. *Fruct.:* 1, *conceptacles* conical, wart-like, sessile on the disc of the articulations, furnished with an apical pore, and containing in the base of the cavity a tuft of erect, pyriform, at length four-parted spore-threads.—AMPHIROA (*Lamour.*), a fanciful mythological name.

Frons calcarea, fragilis, teres v. compressa v. plana, articulata, dichotoma v. pinnatim ramosa v. verticillata. Genicula cartilaginea. Fr.: 1, *conceptacula conica, verrucæformia, ad superficiem articulorum sessilia, apice poro pertusa, in fundo loculi fila sporifera fasciculata erecta demum quadripartita foventia.*

AMPHIROA *australis;* dichotomous or trichotomous; the lower joints linear, compressed, upper broadly oval-oblong, emarginate at each end, flat, sharply edged; nodes naked, short; ceramidia?

A. australis; *dichotoma v. trichotoma; articulis inferioribus linearibus compressis, superioribus elliptico-oblongis utrinque emarginatis complanatis margine acutis; geniculis nudis brevibus; ceramidiis?*

AMPHIROA australis, *Sond. Bot. Zeit.* 1845, *p.* 55. *Preiss, Pl. v.* 2. *p.* 188. *Harv. Ner. Aust. p.* 98. *J. Ag. Sp. Alg. v.* 2. *p.* 537. *Kütz. Sp. Alg. p.* 703.

HAB. Swan River, *Preiss.* Rottnest Island, in deep tide-pools, *W. H. H.*

GEOGR. DISTR. Western Australia.

DESCR. *Root* a hard, stony disc. *Stem* of three or four linear, strongly compressed but round-edged joints, each nearly ½ an inch long and 1–2 lines wide, dividing into branches, which are repeatedly dichotomous or trichotomous, and composed of a series of oval-oblong, flat, thin, and sharp-edged articulations, obtusely indented at each end, particularly at the upper extremity. These *articulations* are ⅓–¾ inch long, and 2–3 lines wide, quite smooth and even; the young terminal ones as long as broad, and somewhat heart-shaped. Lateral *ramuli* of one or two joints are often borne at the nodes of the principal branches, and in some specimens the ramification eventually becomes umbellate. The *nodes* (*genicula*) are minute, naked, and brown. The *colour,* when growing, is a clear, crimson rose-red, which is tolerably preserved in drying. The *substance* is very brittle, but the joints do not so readily fall asunder as in many other species. No *fruit* has been seen.

* * *

Here we have one of the *stone-plants,* which were so long classed by naturalists among the true Corals, and to which the name "*Coralline*" is still given. Externally they are hard; and their substance is so permeated with carbonate of lime that they are as brittle as rigid, and when thrown into any mineral acid will strongly effervesce. After the effervescence has ceased, and the lime been all dissolved, there remains an Algoid body, of the same form as the "Coralline," but soft, and soon dissolving into a mass of small cellules, arranged in slender filaments. The internal substance or living body of the Coralline therefore is an Alga, of similar structure to many others; and these supposed anomalous productions naturally fall in among the Rhodosperms.

The genus *Amphiroa* contains many species, of different external habits, several of which are natives of Australia, and some of the more characteristic will be figured in future numbers. The present is one of the handsomest of the subgenus "*Eurytion*," characterized by the flattened, oblong joints, and dichotomous branching. It and another allied form are among the ornaments of the Rottnest reef-pools, where their brilliant reds and purple contrast well with the rich green of the soft-fronded *Caulerpæ*.

Fig. 1. AMPHIROA AUSTRALIS,—*the natural size.* 2. Young articulations,—*moderately magnified.*

Plate LXXVIII.

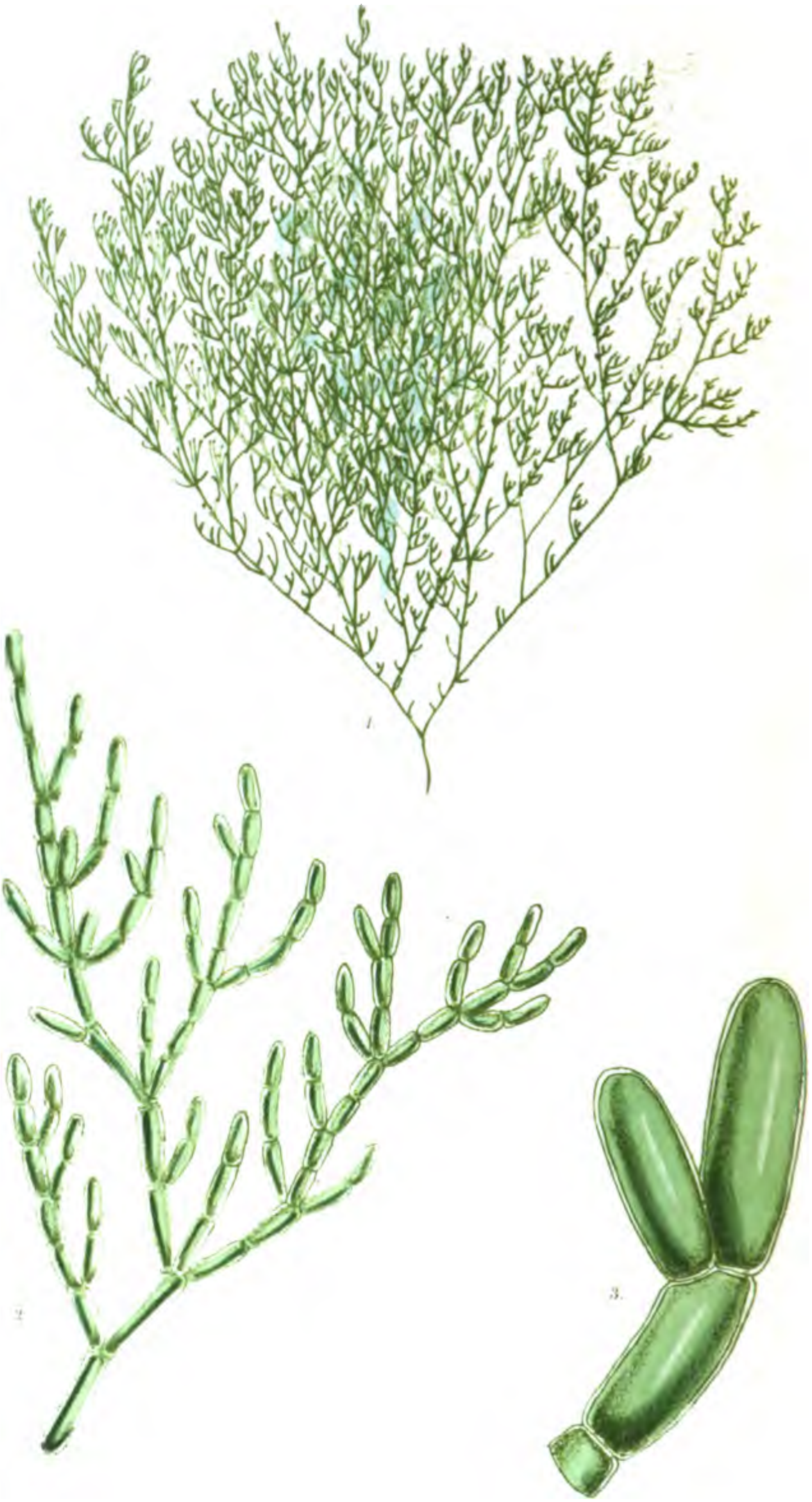


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PLATE LXXVIII.

CLADOPHORA VALONIOIDES, *Sond.*

GEN. CHAR. *Filaments* tufted, articulate, uniform, branched. *Articulations* filled with green granular endochrome, which is changed at maturity into *zoospores.*—CLADOPHORA (*Kütz.*), from *κλαδος, a branch,* and *φορεω, to bear.*

Fila cæspitosa, articulata, ramosa. Articuli endochromate viridi grumoso demum in zoosporas mutato repleti.

CLADOPHORA *valonioides;* densely tufted, bright-green; filaments ultra-capillary, membranaceous, irregularly decompound, subdichotomous, much branched; lesser branches and ramuli often opposite or ternate, the ultimate ones subfasciculate or pectinate; axils acute; apices very obtuse; articulations in the branches 6–8 times, in the ramuli 4–5 times as long as broad, constricted at the nodes, and filled with endochrome.

C. valonioides; *cæspitosa, lætevirens; filis ultra-capillaribus membranaceis vage decompositis dichotomisve ramosissimis; ramis minoribus ramulisque sæpe oppositis v. ternis, ultimis v. fasciculatis v. pectinato-secundis; axillis acutis apicibusque obtusissimis; articulis ramorum diametro* 6–8-*plo ramulorum* 4–5-*plo longioribus, endochromate repletis; geniculis angustis constrictis.*

CLADOPHORA valonioides, *Sond. Pl. Preiss. v.* 2. *p.* 149. *Harv. Alg. Austr. Exsic. n.* 587. *Kütz. Sp. Alg. p.* 391.

HAB. Swan River, *Preiss, W. H. H., G. Clifton, etc.* King George's Sound, *W. H. H.*

GEOGR. DISTR. West Australia; common.

DESCR. *Filaments* densely tufted, 3–8 inches high or more, twice as thick as human hair, very much branched from the base in an irregularly dichotomous or alternate manner. The larger branches sometimes repeatedly divide dichotomously, and sometimes are long and virgate, set at short intervals with small multifid branches. The lesser branches and ramuli are frequently opposite, ternate, or sometimes quaternate, all erecto-patent; in the upper part of the plant they are frequently crowded and almost fascicled, but are sometimes distant, either alternate or secund or pectinated. The joints in the larger branches are 6–8 times as long as broad, or even longer; in the lesser branches and ramuli they are pretty uniformly 3–4–5 times as long as broad; the ultimate ones are ellipsoid and very blunt. All the nodes are constricted and very narrow; and the cell is filled with bright-green endochrome, which partly recovers its form when moistened. The *substance* is membranous, not very soft; and the plant, except when young, does not strongly adhere to paper in drying. The *colour* at first is a bril-

liant grass-green; afterwards it becomes pale, and before the plant perishes, frequently a dirty-white or yellowish.

This is one of the commonest species in Western Australia, where it may be taken to represent the *C. lætevirens* of European seas. The filaments are however more robust, the joints proportionally shorter, and the branching different. Its swollen, blunt cells remind us of a *Valonia;* but the resemblance is one of analogy only.

Fig. 1. CLADOPHORA VALONIOIDES,—*the natural size.* 2. End of a branch and ramuli. 3. Terminal cells:—the two latter figures variously *magnified.*

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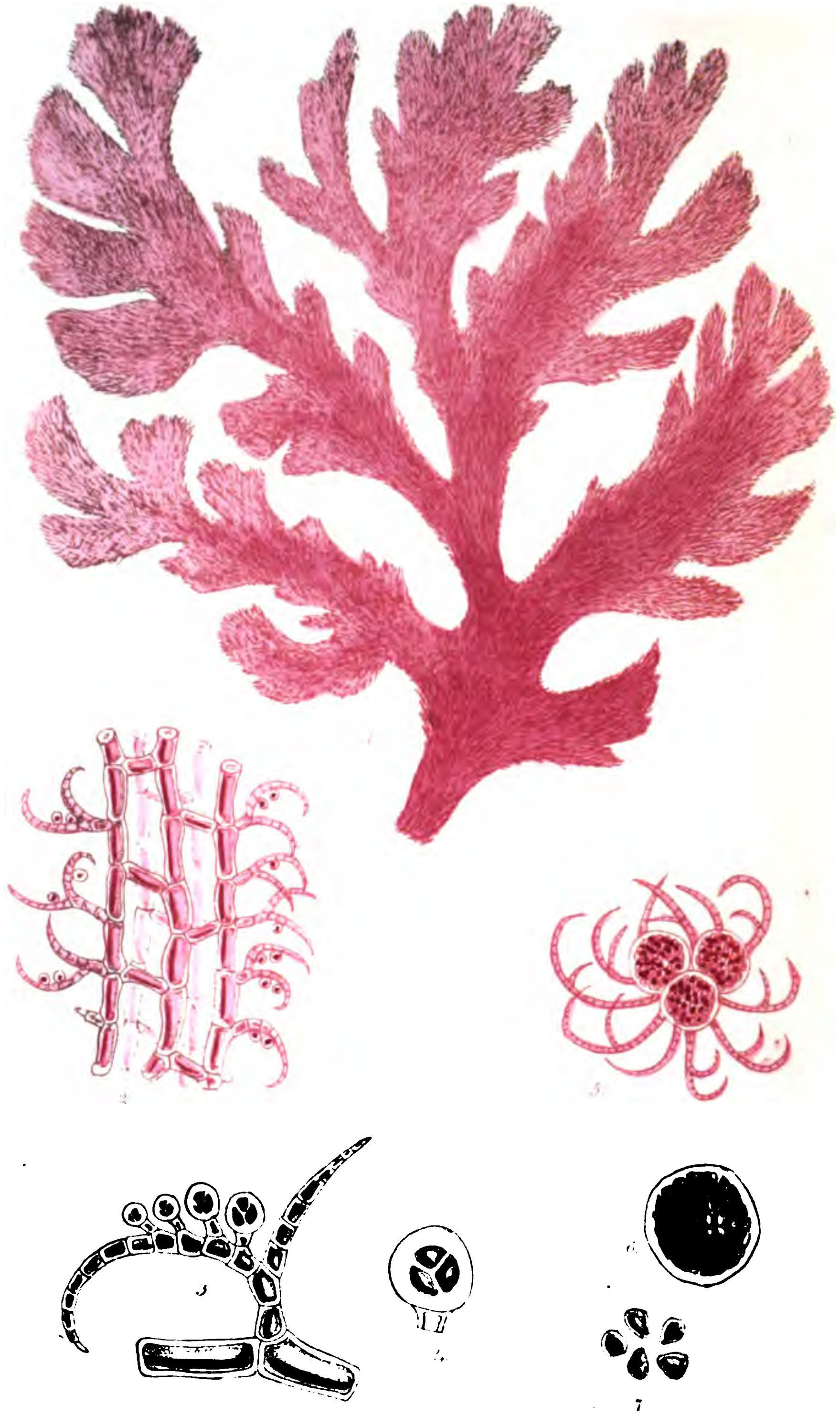
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Plate LXXIX.

HALOPLEGMA PREISSII, *Sond.*

Gen. Char. *Frond* sponge-like, expanded, wholly composed of interwoven and anastomosing confervoid filaments; the central filaments longitudinal, subparallel, anastomosing; the superficial short, vertical, and free. *Fructification:* 1, involucrated favellæ, sessile on the network; 2, tripartite *tetraspores,* borne on the superficial filaments.—Haloplegma (*Mont.*), from ἁλς, *the sea,* and πλεγμα, *a network, or woven substance.*

Frons spongiosa, expansa, filis confervoideis intertextis anastomosantibusque contexta; filis interioribus longitudinalibus subparallelis anastomosantibus, exterioribus liberis verticalibus brevibus. Fruct.: 1, *favellæ involucratæ ad frondem sessiles;* 2, *tetrasporæ triangule divisæ, pedicellatæ, ad ramulos affixæ.*

Haloplegma *Preissii;* frond somewhat flabelliform, subdichotomous, laciniated; the segments pinnatifid; pinnules oblique, falcate, fringed on the outer edge; articulations of the filaments 2–3 times as long as broad.

H. Preissii; *fronde flabelliformi subdichotomo-laciniata; laciniis pinnatifidis sæpe secundis; pinnulis obliquis falcatis extus fimbriatis; articulis filarum diametro 2–3-plo longioribus.*

Haloplegma Preissii, *Sond. Pl. Preiss. v.* 2. *p.* 171. *Kütz. Sp. Alg. p.* 672. *J. Ag. Sp. Alg. v.* 2. *p.* 111. *Harv. Alg. Austr. Exsic. n.* 489, 490.

Rhodoplexia Preissii, *Harv. in Hook. Ic. Pl. t.* 613.

Hab. Western Australia, *Preiss, Drummond, etc.* Common at Fremantle, Rottnest, and King George's Sound; also on many parts of the southern coast, Port Phillip Heads, and Western Port, *W. H. H.* Tasmania, *R. Gunn.* In the Tamar, above Georgetown, *Rev. I. Fereday, etc.*

Geogr. Distr. Western and southern coasts of Australia. Tasmania.

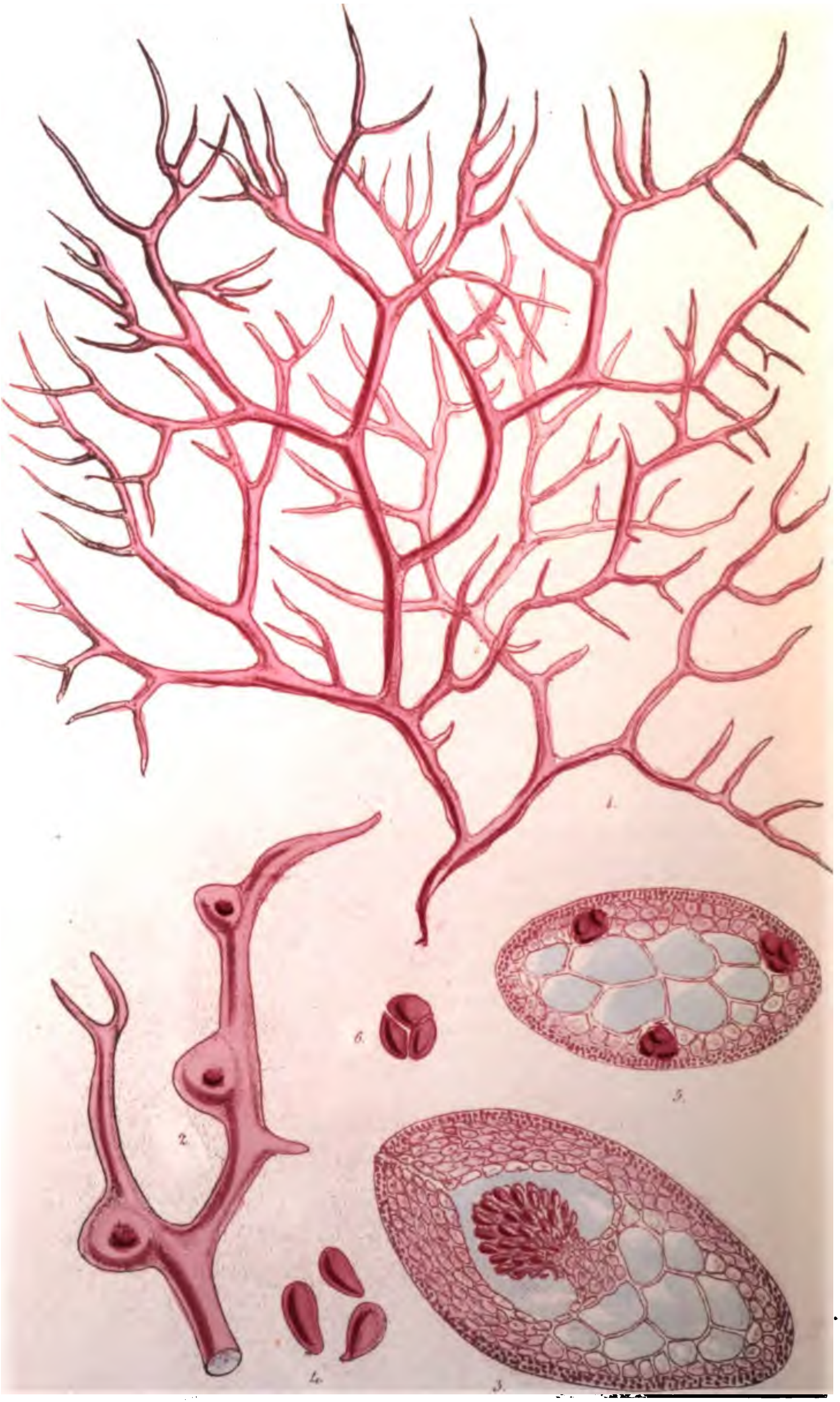
Descr. *Root* a mass of woolly filaments. *Frond* a flat, sponge-like or cloth-like body, very irregular in shape, 3–12 inches long, and as much in expansion of the segments. The form is so greatly varied that it is difficult to describe, except in general terms. The outline, when young, is generally flabelliform, and in some specimens this form is retained, the fan being but slightly cleft into a few shallow segments: in others the frond is dichotomo-multifid, the main branches not more than ¼ inch wide, or even less; the lesser ones deeply pinnatifid or bi-pinnatifid. In other specimens the lesser branches are deeply lobed on one edge only. All the axils are rounded.

The ultimate lobes are very generally falcate, especially the younger ones, and are finely fringed on the rounded or outer edge. The spongy body of the frond is composed of several strata of closely interwoven, anastomosing, and subparallel longitudinal filaments, resembling those of a *Callithamnion;* the surface is coated with a pile of minute, simple or forked, incurved, subulate, horizontally excurrent ramuli. *Favellæ* are clustered, surrounded by an involucre of many ramuli, and scattered over the surface of the network, on which they form little wart-like prominences. *Tetraspores* are plentifully borne on the sides of the ramuli. The *colour* varies from a livid-purple to a clear rosy-red, and fades through orange to yellowish and tawny. The *substance* is membranous, but soft, holding water like a sponge. In drying the plant adheres firmly to paper.

A very curious Alga, with the structure and substance of a sponge, and imbibing water and holding it as freely. By the Tasmanian collectors it is called "*the blanket,*" a name aptly expressing its appearance when fresh, which is that of a piece of flannel or napped cloth. Its external form is greatly varied. Among the multitude of specimens before me there are scarcely two which are moderately alike in ramification. All indeed are formed on the same general plan, and, once seen, the plant is readily recognized under every form; but one is broad and scarcely cleft; another narrow, and cut up into innumerable shreds; and others, like the one selected for our figure, are moderately lobed.

This plant abounds in all parts of the western and southern coast that I have visited. In Tasmania a variety occurs, in the Tamar, a considerable way above Georgetown, and at first looks like a different species, being thinner, and more purple and fan-shaped than the ordinary state. On tracing it down the river to the Heads of Port Dalrymple, it gradually blends into the usual variety, nor is there any microscopic character to distinguish it.

Fig. 1. HALOPLEGMA PREISSII; part of a frond,—*the natural size.* 2. Some of the vertical, anastomosing, central filaments, and the horizontal, free, superficial ramuli; showing their connection. 3. Ramulus, with tetraspores. 4. A tetraspore. 5. An involucrated cluster of favellæ. 6. A favella. 7. Spores:—the latter figures *magnified.*



Vincent Brooks imp.

PLATE LXXX.

GRACILARIA DACTYLOIDES, *Sond.*

GEN. CHAR. *Frond* filiform, compressed, or flat, cartilaginous, irregularly branched, composed of two strata; the medullary stratum of large, roundish, angular cells, smaller outwards, usually containing granules; the cortical of minute cellules, vertically seriated or in a single row. *Fructification:* 1, hemispherical or conoidal conceptacles, sessile on the branches, containing within a thick pericarp obovate *spores* arranged in spore-threads issuing from a basal placenta; 2, *tetraspores* cruciate or tripartite, dispersed among the surface-cellules of the branches and ramuli.—GRACILARIA (*Grev.*), from *gracilis*, 'slender;' applicable to the filiform species.

Frons filiformis, compressa, v. plana, carnoso-cartilaginea, vage ramosa, ex stratis duobus contexta. Stratum medullare cellulis magnis rotundato-angulatis, exterioribus sensim minoribus, materie granulosa sæpe repletis; corticale cellulis minimis uni- v. pluri-seriatis. Fruct.: 1, *conceptacula hemisphærica, sessilia, intra pericarpium crassum fila sporifera e placenta basali radiantia foventia;* 2, *tetrasporæ sparsæ, cruciatim divisæ.*

GRACILARIA *dactyloides;* rose-red, flaccid, carnoso-cartilaginous; frond compressed, subdichotomous or vaguely decompound, with wide angles and spreading branches; branches irregularly multifid, the smaller ones frequently palmatifid; ramuli secund, subulate, attenuate; conceptacles conoidal, secund.

G. dactyloides; *rosea, flaccida, carnoso-cartilaginea; fronde compressa subdichotoma v. vage decomposita; axillis rotundatis ramisque patentibus; ramis irregulariter multifidis, minoribus sæpe palmatifidis; laciniis secundis subulatis attenuatis; cystocarpiis conoideis secundis.*

GRACILARIA dactyloides, *Sond. Bot. Zeit.* 1845, *p.* 55. *J. Ag. Sp. Alg. v.* 2. *p.* 604. *Harv. Alg. Austr. Exsic. n.* 321; *Trans. R. I. Acad. v.* 22. *p.* 550.

PLOCARIA dactyloides, *Sond. in Pl. Preiss. v.* 2. *p.* 190.

SPHÆROCOCCUS dactyloides, *Kütz. Sp. Alg. p.* 776.

HAB. Cast ashore from deep water. Swan River, *Preiss.* Fremantle, *W. H. H., G. Clifton.* King George's Sound?

GEOGR. DISTR. Western Australia.

DESCR. *Root* a small disc. *Fronds* tufted (often parasitical), from 6–10 inches long, seldom more than a line broad, compressed, irregularly dichotomous or variously multifid, preserving a somewhat flabelliform outline. The main divisions are frequently flattened under the axils and expanded to

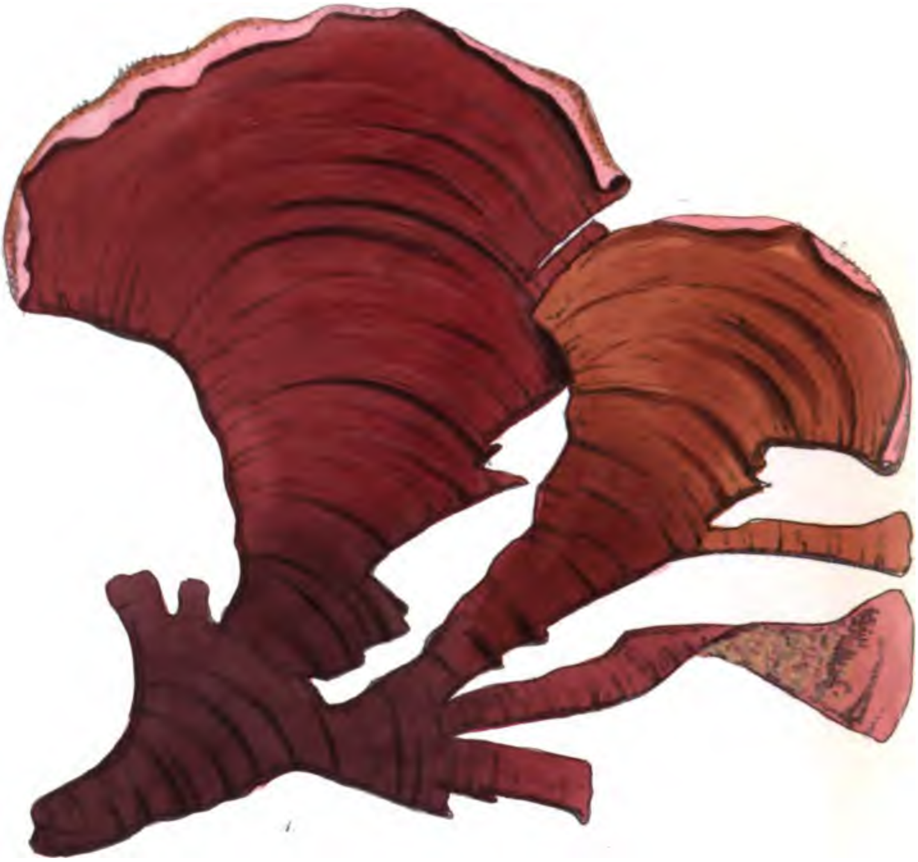
2–3 lines; in this case several branches spring, in a palmate manner, from the flattened portion. The branches are flexuous or zigzag, either several times forked or trifid or secundly divided, but always very widely spreading, with broad rounded axils. The smaller branches are more frequently palmatifid than the larger. The alternate ramuli are generally secund, often 1–1½ inches long, tapering from a broad base to a fine point. (The specimens from King George's Sound differ from the normal state of the species in being more pinnately branched and much more strongly compressed, and may perhaps belong to a different species.) The *conceptacles* are prominently conoidal, abundantly scattered along the branches and ramuli of fertile specimens at distances of about ¼ inch, and are generally secund. The *colour* is a clear rosy-red, preserved in drying. The *substance* is soft, more fleshy than cartilaginous, succulent and tender; and the plant shrinks in drying, and adheres firmly to paper.

As far as Australian Algæ are concerned, this species may be readily known from its congeners by its bright colour and compressed frond. But it is not so easy to point out good external characters by which it may be known from *G. compressa* of Europe. The internal cellular structure is however somewhat different, the cortical layer in the present species being much thinner and generally composed of but one or at most two rows of cellules. The ramification is a good deal varied. The tendency to produce *finger-like* (or rather *palmatifid*) branches is sometimes greater than on the specimens here drawn; and specimens producing conceptacles are often strikingly zigzag, the branch suddenly bending where the conceptacle is seated.

It is not uncommon at Fremantle and Rottnest. The specimens from King George's Sound, above alluded to, are somewhat different, and may possibly belong to a distinct species. At present I retain them, undescribed, for further evidence.

Fig. 1. GRACILARIA DACTYLOIDES,—*the natural size.* 2. Portion of a fertile frond, with *conceptacles.* 3. Section through branch and *conceptacle.* 4. Spores. 5. Section through branch with *tetraspores.* 6. A tetraspore:—the latter figures variously *magnified.*

Plate LIIII.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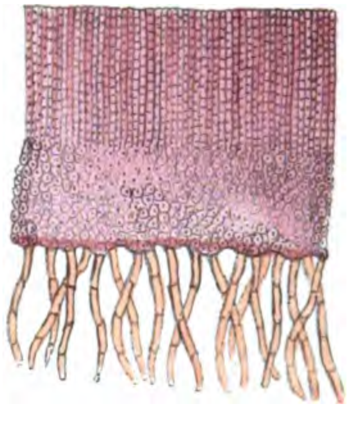
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Vincent Brooks Imp.

PLATE LXXXI.

PEYSSONNELIA AUSTRALIS, *Sond.*

GEN. CHAR. *Frond* flat, horizontally expanded, rooting by fibrils from the lower surface; composed of two strata of cells; the lower stratum of horizontal cylindrical cells, arranged in cohering, longitudinal filaments; the upper of similar cells, set in vertical cohering filaments. *Fructification* of both kinds lodged in superficial *warts* (*nemathecia*): *spores* roundish, in moniliform strings; *tetraspores* cruciate. —PEYSSONNELIA (*Dcne.*), in honour of *J. A. Peyssonnel*, an early and meritorious observer of marine plants, especially of Corallines.

Frons plana, horizontaliter expansa, inferiore pagina radicans, stratis duobus contexta; strato inferiore cellulis cylindraceis horizontalibus in fila longitudinalia cohærentia seriatis, superiore cellulis similibus in fila verticalia ordinatis constante. Fruct.: utriusque generis in nematheciis evoluti. Sporæ subrotundæ, moniliformiter seriatæ; tetrasporæ oblongæ, cruciatim divisæ.

PEYSSONNELIA *australis;* frond affixed at the base, otherwise free, coriaceous, dark-red, flabelliform, zoned, entire; the superior margin thin and often reflexed; the lower surface tomentose with rusty fibrils; "warts of fructification scattered, purple" (*Sond.*).

P. australis; *fronde basi solum adnata coriacea atro-sanguinea flabelliformi rugoso-zonata subintegerrima; margine superiore tenui sæpius reflexo; pagina inferiore plus minus ferrugineo-tomentosa; "verrucis fructiferis sparsis purpureis" (Sond.).*

PEYSSONNELIA australis, *Sond. in Linn. v.* 25. *p.* 685. *Harv. Alg. Austr. Exsic. n.* 328.

HAB. Cast up from deep water. Holdfast Bay, *Dr. Ferd. Mueller.* Port Fairy; and at Shortlands Bluff, Port Phillip, *W. H. H.* Bass's Straits, Tasmania, *Mr. C. Stuart.*

GEOGR. DISTR. Southern coasts, and Tasmania.

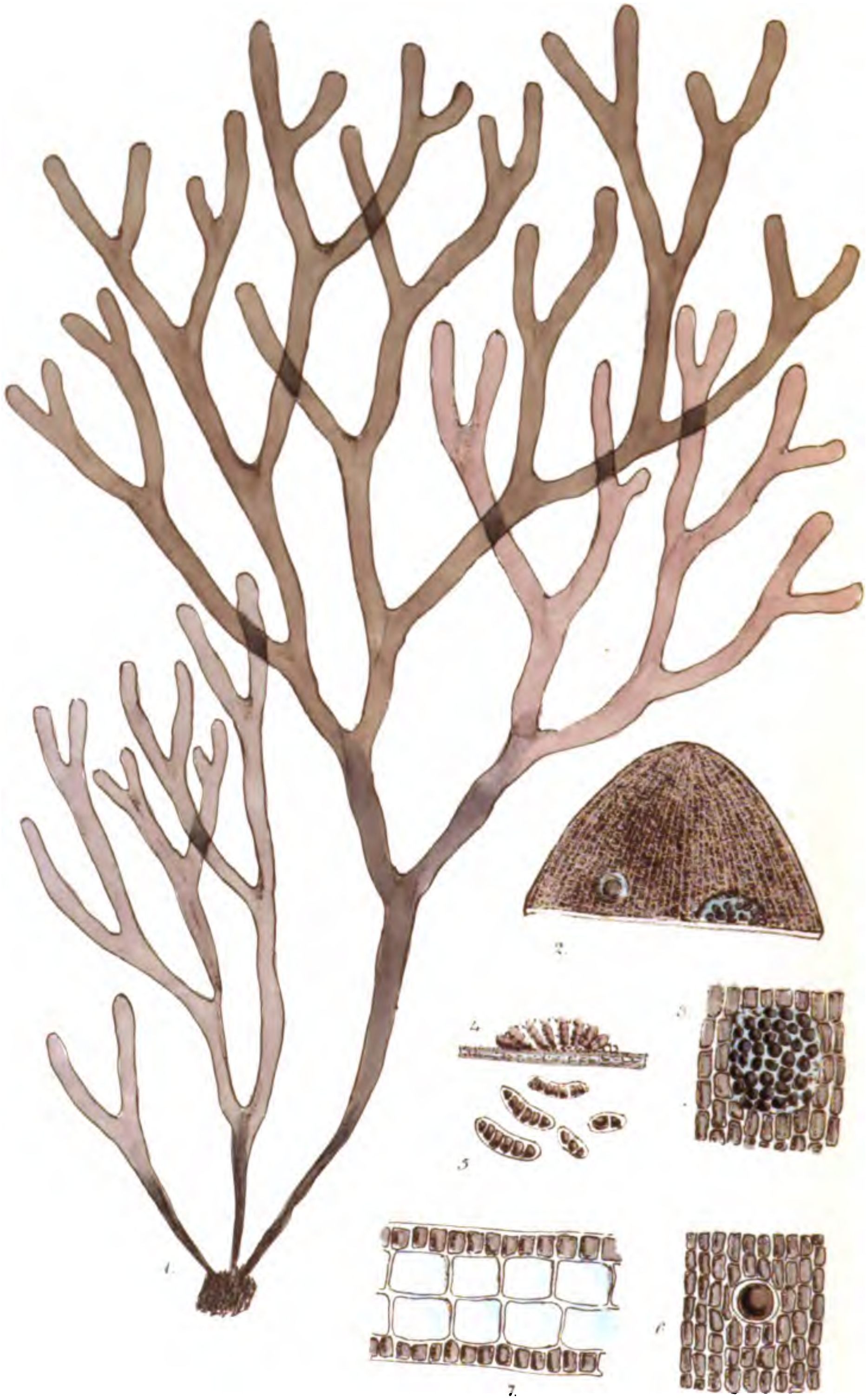
DESCR. *Root* a discoid attachment. *Fronds* one or several from the same base, 3–5 inches long, and nearly as broad in the widest part, cuneate at base, becoming flabelliform as the lamina widens, undivided; but often vertically cloven (from accident), and then each pseudolobe, after growth is renewed, becomes flabelliform like the original frond. The *margin* at the sides and toward the base is thick and perfectly flat; along the curved, upper edge it is thin and membranous, and often folded back on the upper surface. The upper side is perfectly glabrous, somewhat shining, and ridged at short intervals with concentric wrinkles (*zoned*) or lines of growth. The under surface is thickly clothed, except on the younger portion, near the upper edge, with a rusty or buff-coloured tomentum, composed of short, slender, jointed hairs. Our specimens are not in fruit. The *substance* is leathery and tough, retaining its toughness in drying. The *colour* in reflected light is a dark brownish-red, but when viewed with transmitted light is a deep blood-red. On exposure it fades through orange and yellow to dull greenish-white. The plant does not adhere to paper in drying.

The genus *Peyssonnelia,* founded on *P. squamaria,* a native of the Mediterranean, is widely distributed, being represented not only in all the warmer seas, but straggling northward along the coasts of northern Europe. On the Australian shore there are three or four species, of which the one now figured is the largest, broadest, and least divided. I have little doubt but that my plant is the same as Sonder's, though he describes his specimens as being only "an inch long and broad, differing from *P. squamaria* by the undivided lamina and scattered fruit." To this may be added that *P. australis* is much more brightly coloured and more glossy. The concentric zoning is pretty evident on my specimens, and I am not disposed to rely on this character as distinguishing our plant from either *P. major* or *P. squamaria.* If the three forms are to be retained as species, the present must rest on its broad, nearly undivided, and bright-coloured frond.

P. Novæ-Hollandiæ, Kütz., has the bright colour of the present species, but is divided into many narrow sublinear lobes. *P. multifida,* Harv. (Alg. Exsic. 329), from Newcastle, New South Wales, is still narrower and more divided, thick and rigid, and of the dark-brown colour of *P. squamaria.* The fourth Australian species (*P. rubra,* Grev.) is attached by its under surface, thin, crustaceous and brittle when dry, covering stones in deep water: it occurs both in Tasmania and in Port Jackson.

Fig. 1. PEYSSONNELIA AUSTRALIS,—*the natural size.* 2. A vertical section, showing the two strata of which the frond is composed, and some of the fibres of the tomentum,—*magnified.*

Plate LXXXIII



Vincent Brooks, Imp

PLATE LXXXII.

DICTYOTA FASTIGIATA, *Sond.*

GEN. CHAR. *Root* woolly. *Frond* flat, linear, membranous, ribless, areolate, dichotomous or irregularly cleft. *Fructification: spores* superficial, either collected in spot-like sori, or scattered singly over both surfaces of the frond.—DICTYOTA (*Lamx.*), from *δικτυον, a net;* because the surface, under a lens, has a netted, or rather a tessellated appearance.

Radix stuposa. Frons plana, linearis, membranacea, ecostata, areolata, dichotoma aut vage divisa. Fruct.: sporæ superficiales in soros maculæformes aggregatæ v. singulatim per utramque paginam frondis dispersæ.

DICTYOTA *fastigiata;* frond woolly at base, dark-brown, coriaceo-membranaceous, broadly linear, distantly forked; axils rounded; margin very entire, slightly thickened; apices obtuse or minutely emarginate; spores solitary, scattered; tufts of paranemata on the same frond, resembling sori.

D. fastigiata; *fronde basi stuposa badia coriaceo-membranacea lato lineari distanter dichotome partita; axillis rotundatis; margine integerrimo subincrassato; apicibus obtusissimis v. minutissime emarginatis; sporis solitariis sparsis; paranematibus in maculas soriformes collectis in fronde ipsa cum sporis passim evolutis.*

DICTYOTA furcellata, *Sond. Pl. Preiss. v.* 2. *p.* 155. *J. Ag. Sp. Alg. v.* 1. *p.* 100. *Kütz. Sp. Alg. p.* 556. *Harv. Alg. Austr. Exsic. n.* 71.

HAB. Cast ashore from deep water. Western Australia, *Preiss.* Fremantle and Rottnest, common, *W. H. H.*, *G. Clifton.* King George's Sound and Cape Riche, *W. H. H.* Flinders' Island, *Dr. Milligan.*

GEOGR. DISTR. Western and southern coasts of Australia.

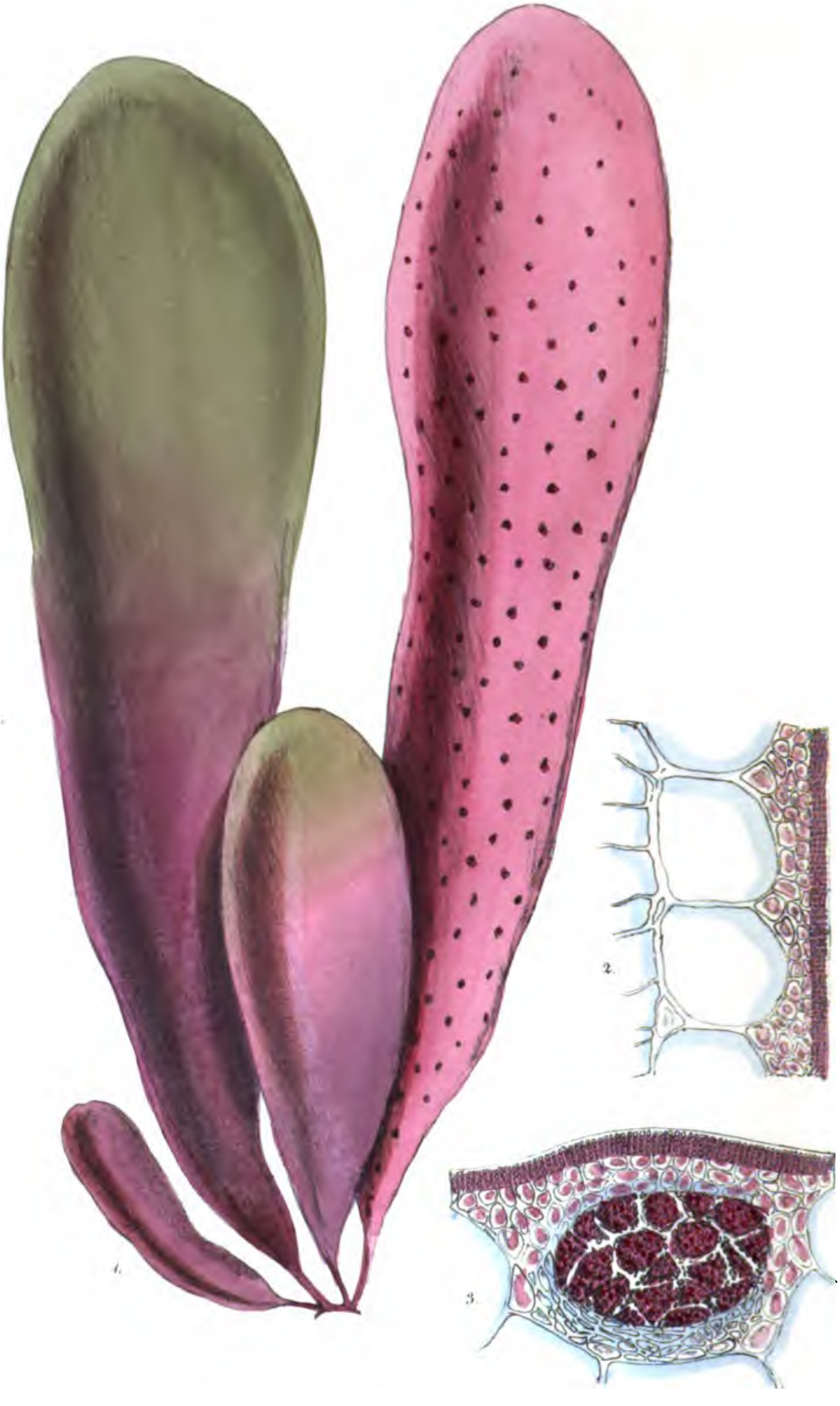
DESCR. *Root* covered with rust-coloured, woolly fibres. *Fronds* tufted, 4–8–12 inches long, not less than a line, and seldom more than 2–3 lines in breadth, preserving a nearly equal breadth throughout, covered with woolly hairs for about ½–1 inch above the base, thence upwards glabrous, repeatedly and pretty regularly dichotomous. The forkings on large specimens are 1–2 inches apart, the axils are in all cases blunt, and the segments are erecto-patent and tolerably fastigiate, the general outline being flabelliform. The *apices* are often perfectly entire, as shown in our figure, but are at least as often minutely emarginate, the indentation only visible with a lens: as the growth proceeds, the notch becomes a commencement of a new fork. The *fruit* is but imperfectly known; our numerous specimens bear indifferently, on the same fronds, either hemispherical, solitary *spores? (antheridia?)*, or roundish or oval clusters of *paranemata* similar to those that accompany the spores in some other species (fig. 4, 5); but no spores here accompany them. The *substance* of the frond is rather thick, and somewhat opaque; a section shows a double row of large, empty, quadrate medial cells, and a single row, at each side, of coloured cellules. The *colour* is a dark-brown, becoming almost black in drying, in which state the plant does not adhere to paper.

This species is readily known from all the forms of *D. dichotoma* by its much thicker, more rigid, and darker-coloured fronds, and by its cellular characters. It appears to be a true *Dictyota*, not a *Stœchospermum*, as Professor Agardh, judging from description, supposes. I have not seen the normal fruit. The scattered *spores* (?) described above are probably antheridia. It is to be hoped that Mr. Clifton may succeed in finding fruit. The species is commonly thrown up in winter along the shores of Western Australia. I have only seen a single specimen from Flinders' Island; and it has not yet been found in any other part of Bass's Straits, or further east than Cape Riche.

Our figure is faulty in one respect; the apices of the laciniæ ought to be very minutely, but sharply, indented. They are commonly so, but not constantly, as it so happened that a perfectly entire apex was selected for figuring.

Fig. 1. DICTYOTA FASTIGIATA,—*the natural size*. 2. Apex of a lobe. 3. Small portion of the surface, with a cluster of *paranemata*, seen vertically. 4. The cluster, seen laterally. 5. Some of the paranemata removed. 6. Small portion of surface, with a solitary *spore?* 7. Section through the membrane:—the latter figures variously *magnified*.

Plate LXIII.



Vincent Brooks, Imp.

PLATE LXXXIII.

GLOIOSACCION BROWNII, *Harv.*

GEN. CHAR. *Frond* bag-like, filled with transparent gelatine, membranaceous, composed of three strata; the *medullary* stratum of very large gelatinous cells, soon ruptured; the *intermediate* of roundish-angular, coloured cells; the *cortical* of minute cellules set in vertical filaments. *Fructification:* 1, globose *flavellidia* immersed in the cells of the intermediate stratum, and composed of numerous confluent nucleoli; 2, *tetraspores* (not known)?—GLOIOSACCION (*Harv.*), from γλοιος, *viscid*, and σακκος, *a bag* or *sack*.

Frons sacciformis, succo gelatinoso hyalino repleta, membranacea, stratis fere tribus contexta; strato medullari cellulis maximis gelatinosis cito ruptis, intermedio cellulis rotundato-angulatis coloratis, corticali cellulis minimis in fila verticalia ordinatis constante. Fruct.: 1, *favellidia globosa, in strato intermedio immersa, nucleolis pluribus confluentibus composita;* 2, *tetrasporæ?*

GLOIOSACCION *Brownii,* Harv.

Var. *a. membranaceum;* bag delicately membranous, rose-red.

Var. *a.* membranaceum; *fronde tenui-membranacea, rosea.*

HALOSACCION hydrophora, *Harv. Alg. Austr. Exsic. n.* 419 (*excl. syn. Post. and Ruppr.*).

Var. *β. firmum;* bag coriaceo-membranous, varying from livid-purple to deep blood-red.

Var. *β.* firmum; *fronde coriaceo-membranacea, livido-purpurea v. viridescente v. rubro-sanguinea.*

HALOSACCION firmum, *Harv. Alg. Austr. Exsic. n.* 420 (*excl. syn. Post. and Rup.*).

FUCUS allantoides?, *R. Br. in Turn. Hist. n.* 4. *p.* 105.

HAB. Cast ashore from deep water. Australia, *R. Brown.* Fremantle, Western Australia, *W. H. H., George Clifton.* Port Phillip, *W. H. H.* In the Tamar, Tasmania, *Rev. I. Fereday, W. H. H., etc.*

GEOGR. DISTR. Western and southern coasts. Tasmania.

DESCR. *Root* a small conical disc. *Frond* rising from a cylindrical stipes ¼–½ inch in length, and ½ line in diameter, bag-like, clavate or fusiform or sausage-shaped, 3–12 or 16 inches in length, and from ¾ inch to 2 inches in diameter. Usually the bag is perfectly simple, the younger ones being pear-shaped or obovate, the older more clavate, and, especially in var. *a*, passing into fusiform; very rarely the bag becomes once or even twice forked. In all cases the apex is obtuse. When recent the bag is filled with a trans-

Plate LXIII

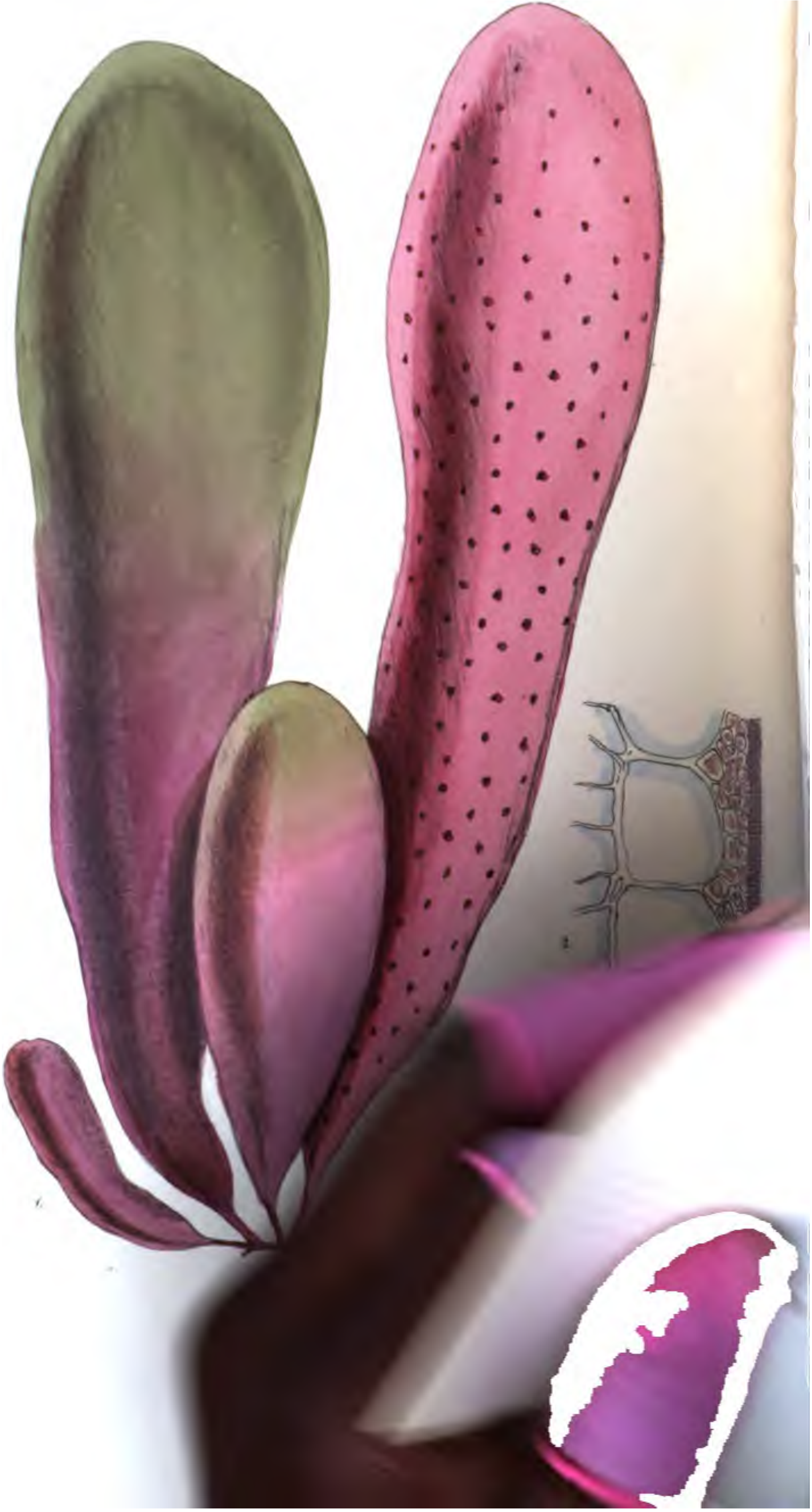


PLATE LXXXIII.

GLOIOSACCION BROWNII, *Harv.*

GEN. CHAR. *Frond* bag-like, filled with transparent gelatine, membranaceous, composed of three strata; the *medullary* stratum of very large gelatinous cells, soon ruptured; the *intermediate* of roundish-angular, coloured cells; the *cortical* of minute cellules set in vertical filaments. *Fructification:* 1, globose *flavellidia* immersed in the cells of the intermediate stratum, and composed of numerous confluent nucleoli: 2, *tetraspores* (not known)?—GLOIOSACCION (*Harv.*), from γλοιος, *viscid*, and σακκος, *a bag* or *sack*.

Frons sacciformis, succo gelatinoso hyalino repleta, membranacea, stratis [illegible] *contexta; strato medullari cellulis maximis gelatinosis cito ruptis,* [illegible] *cellulis rotundato-angulatis coloratis, corticali cellulis minimis in fila verticalia ordinatis constante. Fruct.:* 1, *favellidia globosa, in strato intermedio immersa, nucleolis pluribus confluentibus composita;* 2, *tetraspora!*

GLOIOSACCION *Brownii*, Harv.

Var. *a. membranaceum;* bag delicately membranous, [illegible]

Var. *a.* membranaceum; *fronde tenui-membranacea,* [illegible]

HAL-OSACCION hydrophora, *Harv. Alg. Austr.* [illegible] *and Ruppr.*).

Var. *β* [illegible]; bag coriaceo-membranous, [illegible]

[illegible] *oriaceo-membranacea,* [illegible]

[illegible] *Harv. Alg. Austr.* [illegible]

[illegible] *R. Br. in Turn.* [illegible]

[illegible] ore from deep wat[illegible]

[illegible] Australia, [illegible]

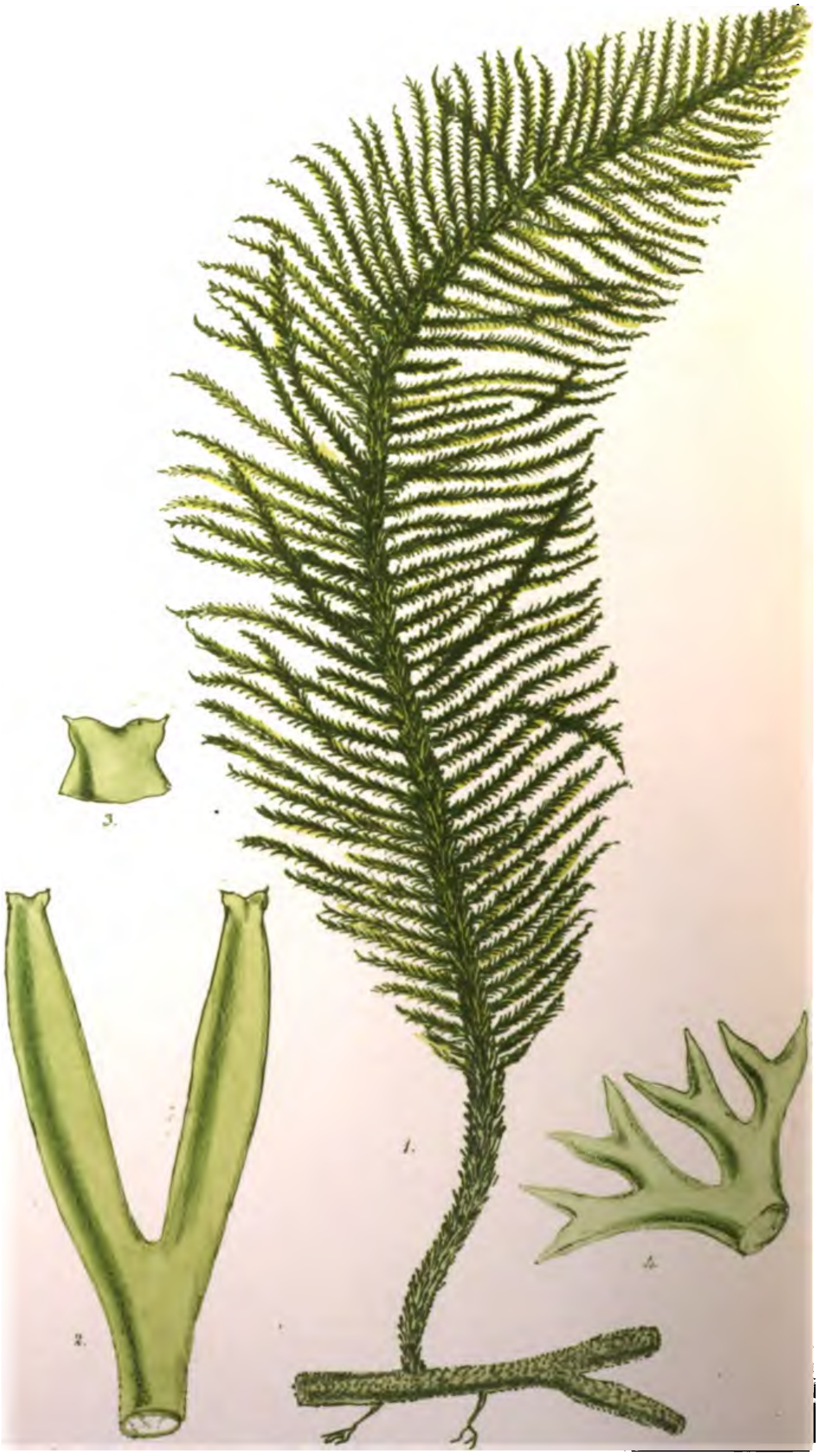
[illegible] Tamar [illegible]

parent gelatine, varying in consistence in different specimens, being sometimes firm, sometimes lax and slimy: it is developed in the large cells of the centre, which soon perish, and have not yet been carefully examined in fresh and young specimens. In drying the gelatine disappears, the membranous frond adheres most closely to paper, and the cells very imperfectly expand on re-moistening. The *conceptacular* fruit consists of *favellidia*, immersed in the frond, below the intermediate layer; they are plentifully scattered over the surface of the bags. *Tetraspores* have not yet been seen. The *colour* varies from rose-red to livid-purple, and the dark-coloured specimens are generally (but not always) more rigid than the brighter-coloured.

In distributing my Alg. Exsic. Austr., I mistook the present plant for a *Halosaccion*, a genus of the North Pacific Ocean, having a very similar external habit, but (as I now know) a different *structure*, and probably (?) dissimilar fruit. The *bags* in *Halosaccion* are filled with air or with sea-water, and are of a rigid substance, and densely cellular structure; in our new genus *Gloiosaccion*, they are normally filled with jelly, and the structure is more lax, and substance greatly softer. I venture to refer to the *F. allantoides*, R. Br. MS., thus noticed by Turner in his account of *F. saccatus* (*Halosaccion*) :—"A third *Fucus*, which seems in a great measure allied to both these, has been sent to me by Mr. Brown, from New Holland. Its interior is filled with gelatine, its membranous coat partakes of the same gelatinous nature, and its shape is remarkably pyriform,"—all which characters answer to the species now figured. Our two varieties differ chiefly in colour; and numerous specimens, from various stations, show the passage of one form into the other. I once found a specimen *forking* twice, and thus resembling *Scinaia furcellata*.

Fig. 1. Fronds of GLOIOSACCION BROWNII;—*the natural size*. 2. Section of membrane, to show cellular structure. 3. A similar section, cutting through a *favellidium*:—the latter figures highly *magnified*:

Plate LXXI.



Vincent Brooks, Imp.

PLATE LXXXIV.

CAULERPA HYPNOIDES, *Ag.*

GEN. CHAR. *Frond* consisting of prostrate *surculi*, rooting from their lower surface, and throwing up erect branches (or secondary fronds) of various shapes. *Substance* horny-membranous, destitute of calcareous matter. *Structure* unicellular, the cell (*frond*) continuous, strengthened internally by a spongy network of anastomosing filaments, and filled with semifluid grumous matter. *Fructification* unknown.—CAULERPA (*Lamx.*), from *καυλος, a stem,* and *ἑρπω, to creep.*

Frons ex surculis prostratis hic illic radicantibus et ramis erectis polymorphis formata. Substantia corneo-membranacea. Structura unicellulosa, cellulæ membrana continua hyalina intus filis cartilagineis tenuissimis anastomosantibus firmata et endochromate denso viridi repleta. Fruct. ignota.

CAULERPA *hypnoides;* surculus robust, densely covered with cylindrical, dichotomous scales; frond erect, stipitate, lanceolate, attenuate, pinnated; stipes and pinnæ everywhere clothed with forked, cylindrical, obtuse, emarginate and mucronulate, spreading, bright-green ramenta.

C. hypnoides; *surculo crasso squamulis cylindraceis dichotomis dense muricato; fronde erecta stipitata lanceolata utrinque attenuata pinnata; stipite pinnisque foliolis undique obtectis; foliolis medio furcatis cylindraceis obtusis apice emarginatis mucronulatis patentibus læte viridibus.*

CAULERPA hypnoides, *Ag. Spec. Alg. v.* 1. *p.* 443. *Ag. Syst. p.* 183. *Endl.* 3*rd Suppl. p.* 16. *Hook. Fl. N. Zeal. v.* 2. *p.* 260. *Harv. Alg. Exsic. Austr. n.* 550.

CHAUVINIA hypnoides, *Kütz. Sp. Alg. p.* 497.

FUCUS hypnoides, *R. Br. in Turn. Hist. Fuc. v.* 3. *p.* 93. *t.* 173.

HAB. In deep tide-pools, and the vertical sides of reefs, at and below low-water mark. Common along the western and southern shores, and in Tasmania.

GEOGR. DISTR. Australia, Tasmania, New Zealand.

DESCR. *Surculi* extensively creeping, several inches long, 2–3 lines in diameter, rooting at long or short intervals, very closely covered with extremely minute, twice or thrice forked scales, so closely set that the surface formed of their points is quite even and velvety. *Fronds* 10–12 inches or more in length, on a stipes 1–2 feet long, regularly lanceolate in outline, narrowed towards each end, closely pinnate. The *stipes* and *rachis* are densely imbricated with forked ramenta. The *pinnæ* are distichous, simple or rarely forked, setaceous, 1–2 inches long, closely set, patent and somewhat curved, and are clothed with tri-quadrifarious, patent *ramenta,* forked a short way below their middle, and about a line in length. The apices of the prongs of the fork are emarginate, each lobe simply (not doubly) mucronulate. Generally the frond is but once pinnate; but in luxuriant specimens the rachis throws out secondary rachides, which are in turn pinnated, and a bipinnate or even dendroid frond is formed. The *colour* is a peculiarly bright grass-green, inclining to yellowish in age. The *substance* is soft and flaccid in the pinnated portion of the frond, which adheres closely to paper; but rigid and rough in the stipes and surculi, which do not adhere to paper.

By comparing the Plate now given with Plate II. (*C. Muelleri*), the resemblances and differences between these closely allied species may be seen. Externally the present differs from the former in its bright-green or yellowish colour, in the more lanceolate general outline, and in the more laxly set and patent or squarrose ramenta. The microscope reveals another and more essential character; the ramenta in *C. hypnoides* being forked near the middle; and in *C. Muelleri* at the very base. The present is much the commonest species; extending along the whole west and south coasts of Australia, and to Tasmania and New Zealand. It bears a remarkably close resemblance to a Swiss fossil, figured by Brongniart, under the name "*Fucoides hypnoides*" (Brongn. Hist. t. 9 *bis*, t. 1–2).

Fig. 1. CAULERPA HYPNOIDES,—*the natural size*. 2 One of the forked ramenta. 3. Apex of one of the prongs. 4. One of the dichotomous scales from the surculus:—the latter figures variously *magnified*.

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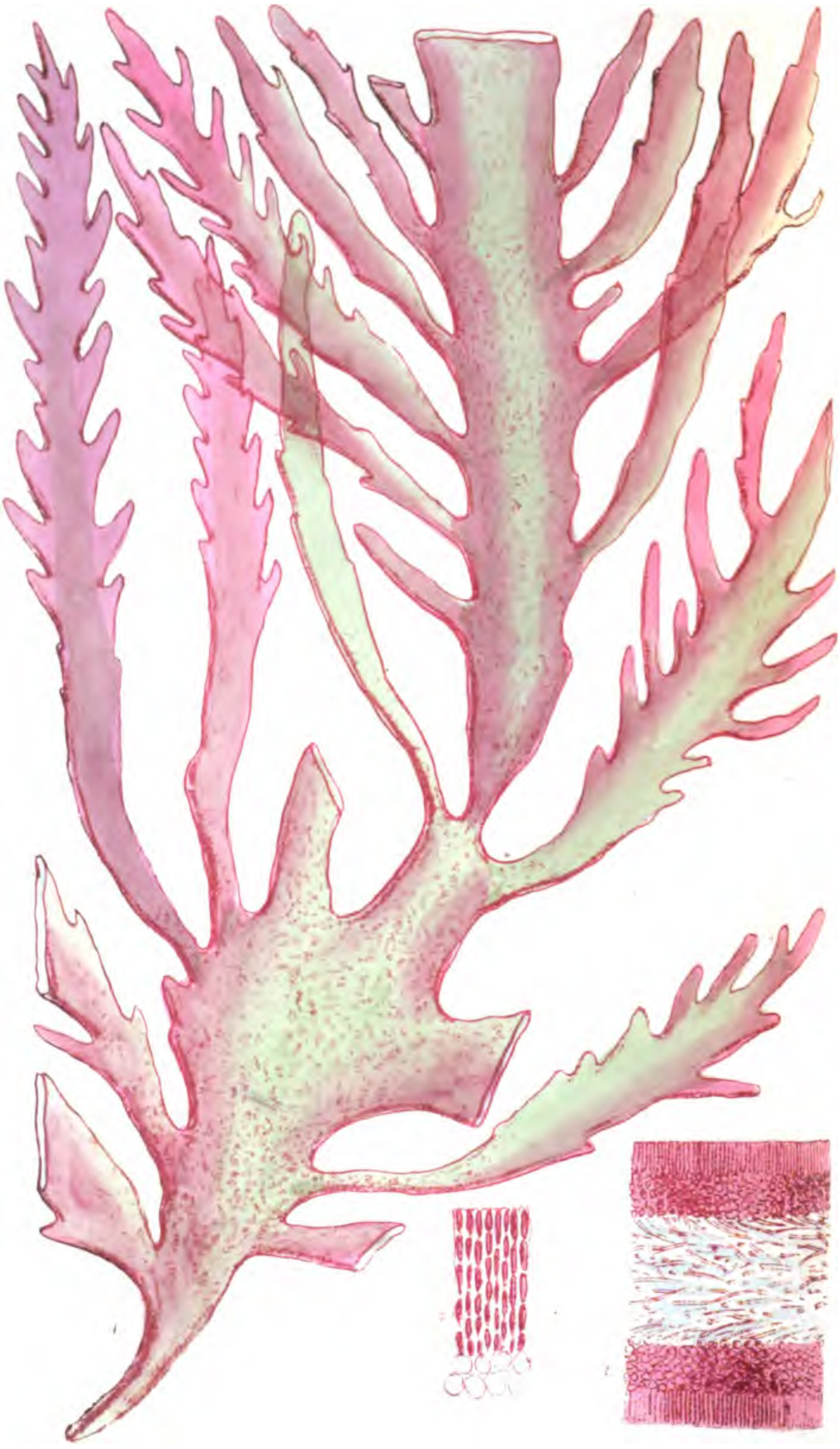

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PLATE LXXXV.

GELINARIA ULVOIDEA, *Sond.*

GEN. CHAR. *Frond* thick and fleshy, flat, irregularly pinnatifid, composed of three strata; the *medullary* of densely packed, interwoven, longitudinal filaments; the *intermediate* of several rows of roundish-angular cellules; the *cortical* of vertical, closely packed filaments. *Fructification* unknown.—GELINARIA (*Sond.*), from *gelu*, 'frost;' whence *gelatine*, in allusion to the substance of this plant.

Frons cartilagineo-carnosa, plana, vage pinnatim composita, stratis tribus constituta; strato medullari ex filis densissime implexis longitudinalibus, intermedio cellulis parvis pluriseriatis rotundato-angulatis, corticali filis verticalibus crebris formato. Fructus ignotus.

GELINARIA *ulvoidea*, Sond.

GELINARIA ulvoidea, *Sond. in Mohl and Schl. Bot. Zeit.* 1845, *p.* 55. *Sond. in Lehm. Pl. Preiss. v.* 2. *p.* 172. *J. Ag. Sp. Alg. v.* 2. *p.* 197. *Harv. in Trans. R. I. Acad. v.* 22. *p.* 556. *Harv. Alg. Exsic. n.* 434.

HALYMENIA ulvoidea, *Kütz. Sp. Alg. p.* 718.

HAB. Western Australia, *Preiss.* Freemantle, *W. H. H.*, *G. Clifton.* Also at King George's Sound, *W. H. H.*

GEOGR. DISTR. West and south-west coasts of Australia.

DESCR. *Root* a fleshy, expanded disc, nearly ½ inch in diameter. *Frond* stipitate; the stipes compressed, 1–1½ lines in diameter, firmly cartilaginous, 1–2 inches long, gradually expanding into the cuneate base of the frond. *Frond* 1–2 feet long, and nearly as much in the expansion of the segments, repeatedly divided and very irregularly on a pinnatifid type. The principal axile segment or *rachis* is 1–2 inches broad, subsimple or forked, tapering much to the base, and generally abrupt, but sometimes lanceolate at the apex. This is closely or distantly pinnated with lateral, linear-lanceolate *branches*, which in young specimens are simply toothed or inciso-dentate; in older, once or twice pinnatifid; the *pinnules* acute, the younger ones subulate, the older sublanceolate. In some specimens the branches are ½–1 inch broad, and but little divided; in others ¼–⅛ inch, and several times compound, the ultimate laciniæ being very narrow. No *fruit* has yet been seen. The *substance* is very firmly fleshy and somewhat crisp, or cartilaginous when fresh; soon becoming soft, and decomposing in fresh-water; when dry, gelatino-membranaceous, closely adhering to paper. The proper *colour* is a full-lake, staining paper with a pinky tinge, but more commonly the frond is tinted with livid-red or greenish, and finally the whole fades to a dull, pale greenish-white. The *surface* has a peculiarly mottled appearance, which is most obvious in the brightest-coloured specimens, and is caused by the alternately darker or paler gonidia (cellules of the intermediate stratum), seen through the superficial layer. The *structure* is much denser than in *Halymenia*, more similar to that of *Kalymenia*.

Until the fructification of this remarkable plant be discovered, its exact affinities cannot be satisfactorily settled. By Kützing it is referred to *Halymenia*, a genus which at different times has been made to comprise a number of heterogeneous types. The present species appears to me to be one of such, for judging by the structure of the frond, I should suspect that its position will be nearer to *Kallymenia* among the genera with compound nuclei (*favellidia*). Sonder originally described it from very incomplete and discoloured specimens. It is one of the largest and strongest-growing of the Western Australian *Rhodosperms*, and would require a folio plate to do it adequate justice. Some specimens are very much narrower and more densely branched than the one here figured.

There is another Western Australian Alga (*Nemastoma? gelinarioides*, Harv.), found at King George's Sound, which bears a striking external resemblance to this plant; but its structure is different and much more dense. Its fruit also is unknown, and the name given to it must therefore be considered provisional.

Fig. 1. GELINARIA ULVOIDEA,—*the natural size*. 2. Section through the frond, —*magnified*. 3. Minute portion of the cortical stratum:—more highly *magnified*.

Pl. LIII.

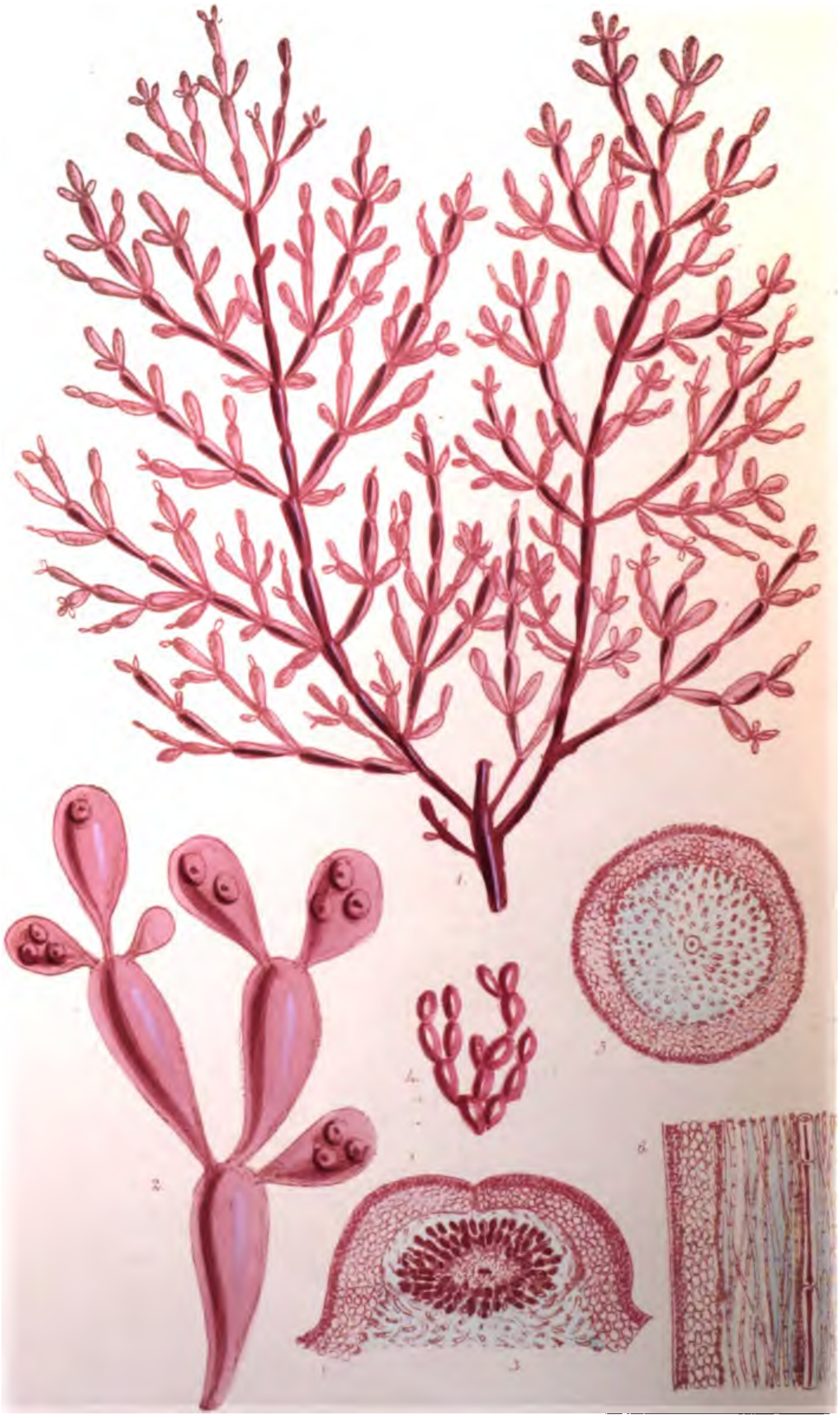

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PLATE LXXXVI.

ERYTHROCLONIUM SONDERI, *Harv.*

GEN. CHAR. *Stem* terete, its branches constricted as if jointed, composed of an articulated axial filament, and three strata; the medullary stratum composed of longitudinal, interwoven filaments; the *intermediate* of several rows of roundish, coloured cellules; the *cortical* of very minute, subseriated cellules. *Fructification:* 1, *conceptacles* sessile, depressed, umbilicate, opening by a terminal pore, containing, within a thick pericarp, moniliform strings of spores, radiating from a free central placenta; 2, zonate *tetraspores*, dispersed through the cortical cells.—ERYTHROCLONIUM (*Sond.*), from ερυθρος, *red*, and κλων, *a branch.*

Frons caule tereti, ramisque articulato-constrictis, ex filo centrali articulato et stratis tribus cellularum constituta; strato medullari filis tenuibus longitudinalibus intertextis, intermedio cellulis rotundato-angulatis pluriseriatis, corticali cellulis minimis subseriatis formato. Fruct.: 1, *cystocarpia sessilia, depressa, umbilicata, carpostomio demum aperta, intra pericarpium crassum fila sporifera moniliformia ex placenta centrali radiantia, foventia;* 2, *tetrasporæ sparsæ, zonatim divisæ.*

ERYTHROCLONIUM *Sonderi;* stem thick, short, glabrous; branches trichotomous, their joints and the ramuli elliptic-oblong or clavate, very obtuse.

E. Sonderi; *caule brevissimo crasso glabro; ramis trichotome decompositis, articulis ramulisque clavatis elliptico-oblongis obovatisve obtusissimis.*

ERYTHROCLONIUM Sonderi, *Harv. Alg. Exsic. n.* 391.

RHABDONIA Sonderi, *Harv. in Trans. R. I. Acad. v.* 22. *p.* 554, *excl. Syn. J. Ag.*

HAB. Fremantle, *W. H. H., G. Clifton.*

GEOGR. DISTR. Western Australia.

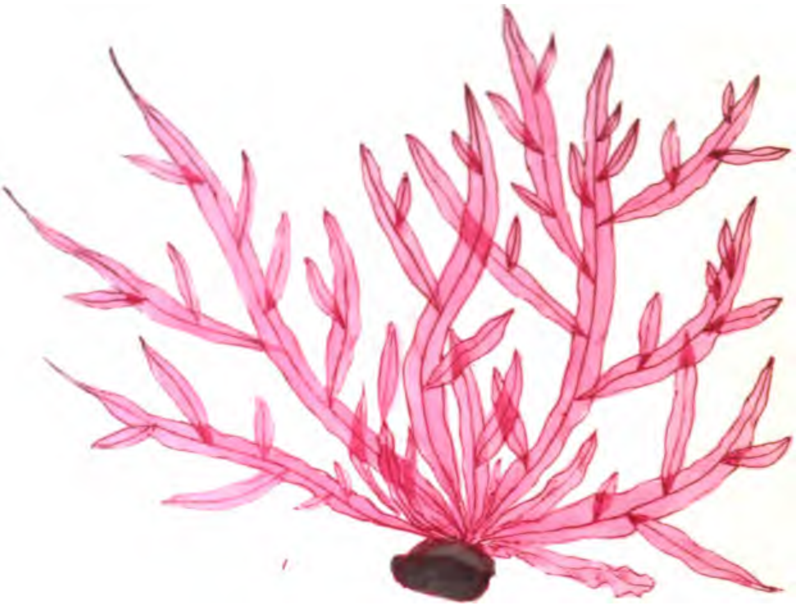
DESCR. *Root* discoid. *Stem* ½–1 inch long, sometimes bulbous, 1–2 lines in diameter, solid and rigid, suddenly breaking up into numerous, much divided branches. These branches are 4–6 inches long, constricted as if jointed at intervals of about one-third of an inch, and sub-trichotomously decompound. The *branches* and their subdivisions opposite, or occasionally alternate or secund. The *ramuli* sometimes subverticillate, four or five springing from a node. In the lower part of old branches the nodes are obscurely marked, and the branch becomes solid and subcontinuous, assimilating with the stem; in all younger parts the constrictions are regular and strong.

The internodes and ramuli are always obtuse at the extremity and acute at base, but they vary in shape from linear-clavate to obovate, the former being the prevalent form of the older, the latter of the younger internodes. The *conceptacles* occur, several often together, on the younger lateral or terminal ramuli; they are prominent, but depressed or umbilicate in the centre, and contain a placenta, suspended in the midst of a large cavity, and emitting to all sides slightly branched, moniliform spore-threads. The *structure* of the frond varies with age; in the younger parts the filaments of the medullary layer are few and distant, in the older they are very dense, and in the oldest parts closely intertwined. The *colour* is a full dark blood-red, becoming darker in drying. The *substance* is soft, and somewhat juicy, and the frond adheres closely to paper in drying.

The genus *Erythroclonium* is allied on the one side to *Rhabdonia* and on the other to *Areschougia*. From the first it differs by having a central or axile filament, and from the latter in habit, and having more prominent conceptacles. The species here figured, and to which I have given the name of the proposer of the genus, greatly resembles in aspect the *E. Muelleri*, one of the original species described by Sonder. It differs chiefly in the stem, which is here quite smooth and even, while in *E. Muelleri* it is rough, with short tubercular or filiform processes. The present is quite a western, and *E. Muelleri* a south-eastern form. Our plant is less densely branched, more rigid, and less gelatinous, and more deeply coloured than *E. Muelleri*, and is usually larger or more robust; but at Georgetown, Tasmania, *E. Muelleri* grows to a greatly larger size, through which, however, it preserves its peculiar characters. I am therefore disposed to consider these two plants as truly distinct, though nearly allied to each other.

Fig. 1. ERYTHROCLONIUM SONDERI,—*the natural size.* 2. Branchlets with conceptacles. 3. Section of a conceptacle. 4. Spore-string from the same. 5. Cross section of a branch. 6. Longitudinal semi-section of the same:—the latter figures variously *magnified.*

Plate LXXVII.



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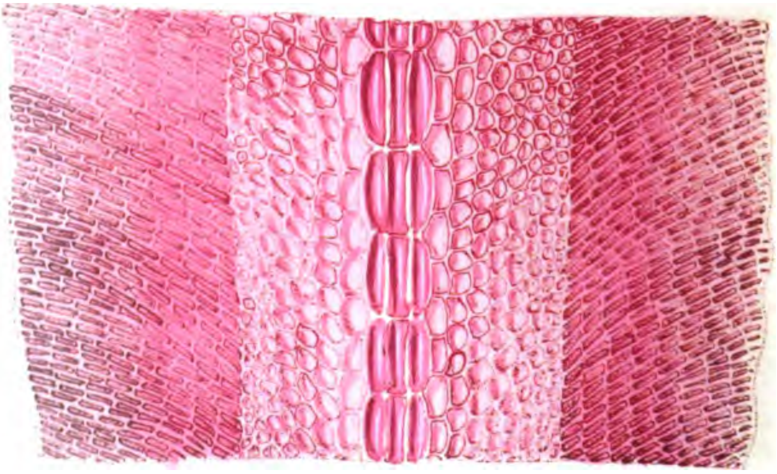


Vincent Brooks, Imp.

PLATE LXXXVII.

DELESSERIA HYPOGLOSSOIDES, *Harv.*

GEN. CHAR. *Frond* leaf-like, membranous, areolated, symmetrical, simple or branched, midribbed. *Fructification:* 1, hemispherical *conceptacles,* sessile on the midrib or on a lateral nerve, containing a tuft of moniliform spore-threads on a basal placenta; 2, tripartite *tetraspores,* in definite sori or spots, on the frond or on accessory leaflets.—DELESSERIA (*Ag.*), in honour of Baron Delessert, a distinguished patron of botany.

Frons foliacea, membranacea, areolata, symmetrica, simplex v. ramosa, costata. Fruct.: 1, coccidia in costa venisque frondis sessilia, hemisphærica, fila sporifera moniliformia a placenta basali emissa foventia; 2, tetrasporæ triangule divisæ, in soros definitos collectæ.

DELESSERIA *hypoglossoides;* dwarf, decumbent; frond linear-lanceolate, repeatedly proliferous from the three-tubed, jointed midrib, with leaflets of a similar form; leaflets acute or acuminate, very entire; fruit?

D. hypoglossoides; *pusilla, decumbens; fronde lineari-lanceolata e costa tenui trisiphonia articulata repetite prolifera; foliolis acutis acuminatisve integerrimis.*

DELESSERIA hypoglossoides, *Harv. in Trans. R. I. Acad. v.* 22. *p.* 548. *Harv. Alg. Exsic. Austr. n.* 282.

HAB. Rottnest Island, *W. H. H.* Garden Island, Western Australia, *G. Clifton.* Dredged in Port Jackson, *C. Moore.*

GEOGR. DISTR. Western Australia. Port Jackson, New South Wales.

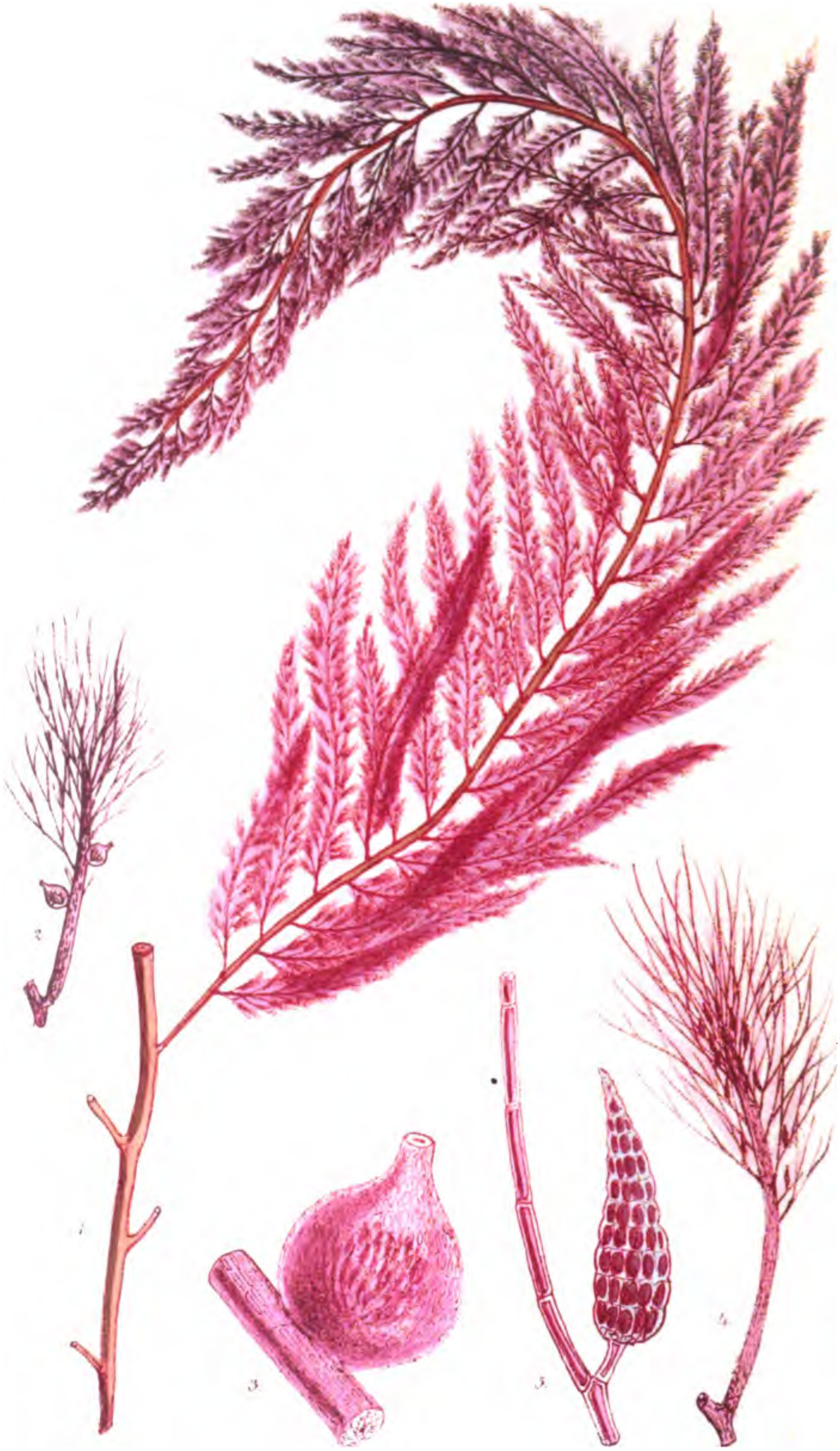
DESCR. *Root* somewhat creeping. *Fronds* 1–3 or 4 inches long, normally quite simple, 1–3 lines in diameter, linear-lanceolate, acute at each end, and often prolonged at the apex into a subulate or filiform acumination. From the midrib of this primary leaf spring other leaflets of similar form; and their midribs emit others: thus by repeated proliferous growth the old fronds may become densely much branched. The *midrib* is very slender, jointed at short intervals, each joint formed of three oblong cellules, of which the middle one is cylindrical, and the lateral flat on the inner and angularly convex on the outer side. At each side of this midrib is a broad band of roundish-angular cells, gradually diminishing in size outwards, and passing into somewhat horizontally seriated linear cells, which terminate in the very entire, flat margin. No *fruit* has yet been seen. The *colour* is a clear rosy-red or carmine. The *substance* is delicately membranous, and the plant in drying adheres firmly to paper.

At first sight this plant would pass for a weak-growing specimen of *Delesseria Hypoglossum,* so common on the shores of Britain, and of some coasts of Europe and North America; and which is also closely related to *D. crassinervia* of the Antarctic zone. But the microscope at once reveals characters in the midrib and in the cellular structure of the lamina, which are both readily seen and constant, and which therefore mark the species. The jointed three-tubed midrib is found in several other species, both Australian and American; but not in *D. hypoglossum,* or any of the European kinds. It was first observed in *D. Leprieurii,* where it is even more strongly marked than in the present.

Our plant is closely related to *D. spathulata,* Sond., also a West Australian species, and which differs much as *D. ruscifolia* does from *D. Hypoglossum.*

Fig. 1. Delesseria hypoglossoides, *the natural size.* 2. Portion of a leaf, *magnified;* showing the distribution of the cells in the membrane, and the jointed midrib.

Plate LXXVIII.



Vincent Brooks Imp.

Ser. **Rhodospermeæ.** Fam. *Rhodomelaceæ.*

Plate LXXXVIII.

DASYA HAPALATHRIX, *Harv.*

Gen. Char. *Frond* filiform or compressed, dendroid; stem and branches coated with small, polygonal cells (rarely articulated, and many-tubed); the axis articulate, composed of several radiating cells surrounding a central cavity; ramelli articulated, one-tubed. *Fructification:* 1, ovate or urceolate *ceramidia;* 2, lanceolate *stichidia,* attached to the ramelli, and containing triangularly-parted tetraspores in transverse rows.—Dasya (*Ag.*), from δασυς, *hairy.*

Frons filiformis v. compressa, dendroidea. Caulis ramique majores strato cellularum corticati (raro pellucide articulati), ramellis monosiphoniis obsessi; axis articulatus, ex cellulis pluribus radiantibus tubum centralem cingentibus formatus. Fruct.: 1, *ceramidia ovata v. urceolata;* 2, *stichidia lanceolata, ex ramellis enata, tetrasporas transversim ordinatas foventia.*

Dasya *hapalathrix;* stem very long (3–6 feet), percurrent, inarticulate, quite glabrous; branches lanceolate in outline, alternate, twice or thrice pinnately decompound, the ultimate ramifications setaceous, all corticated and opaque; ramelli confined to the ultimate branchlets, very soft and byssoid, dichotomous, their articulations 4–5 times as long as broad; ceramidia (rather small) sessile, urceolate, with a prominent orifice; stichidia ovato-lanceolate, acuminate.

D. hapalathrix; *caule longissimo (3–6-pedali) percurrente inarticulato glaberrimo; ramis lateralibus circumscriptione lanceolatis alternis bis terve pinnatim decompositis; ramulis ultimis setaceis, omnibus corticatis opacisque; ramellis ramulos ultimos solum vestientibus mollissimis byssoideis dichotomis, articulis diametro 4–5-plo longioribus; ceramidiis (parvulis) sessilibus ovato-urceolatis ore prominulo; stichidiis ovato-lanceolatis acuminatis.*

Dasya hapalathrix, *Harv. Alg. Austr. Exsic. n.* 201. *Harv. in Hook. Fl. Tasm. v.* 2. *p.* 301.

Hab. Port Phillip Heads, *W. H. H.* Georgetown, Tasmania, *R. Gunn, Rev. I. Fereday.* Abundantly at Point Rapid, in the Tamar, *W. H. H.*

Geogr. Distr. South coast of Australia. Tasmania.

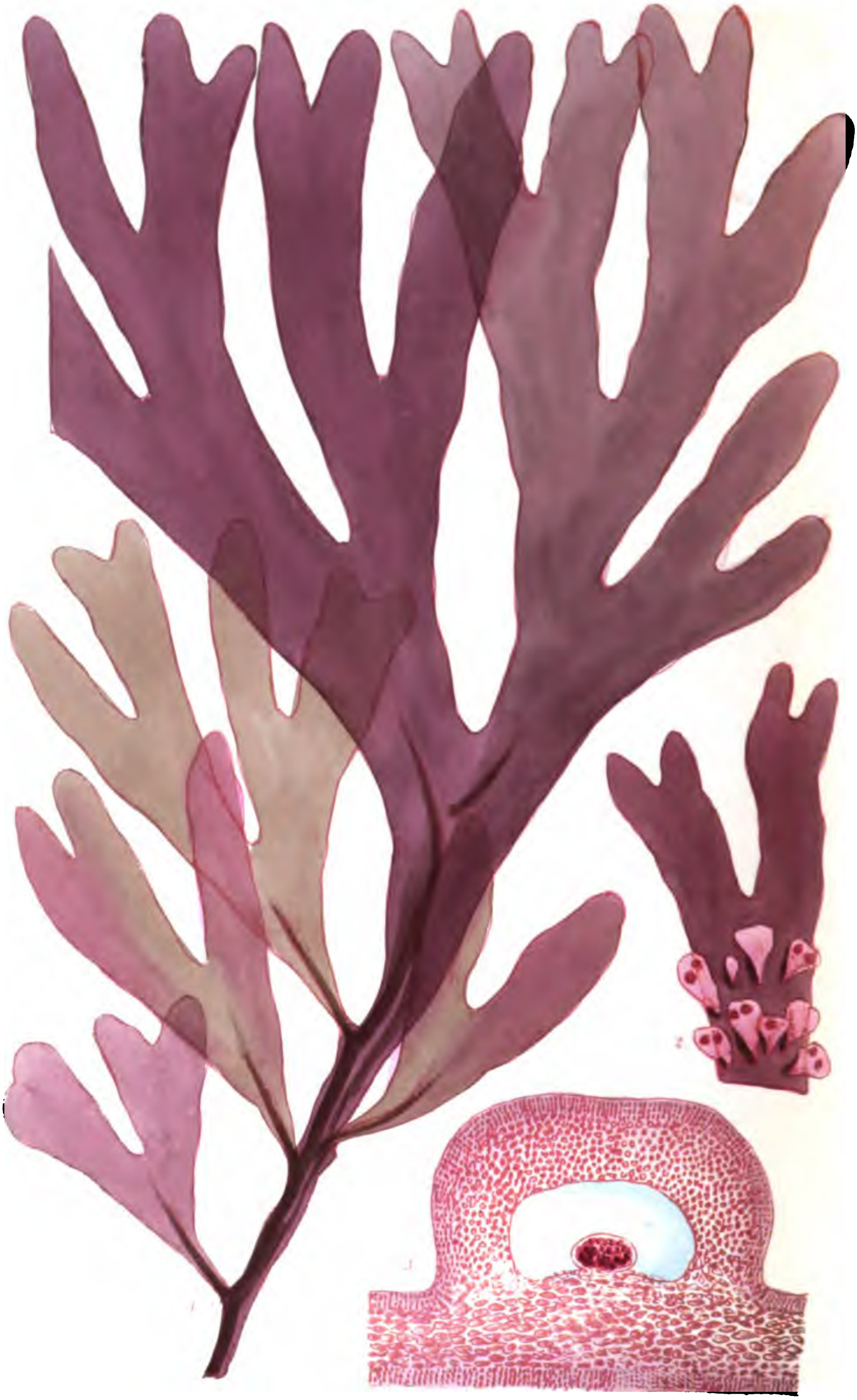
Descr. *Root* discoid. *Frond* 3–6 feet long, one or two lines in diameter, with a linear-lanceolate general outline, not perfectly distichous: with a percurrent, glabrous and glossy, opaque stem, set at intervals of one or two inches with lateral branches, the lower and middle ones of which are a foot long, the upper gradually shorter, all somewhat attenuated at base, and glabrous and inarticulate like the stem. These branches are closely set with sub-spirally inserted, alternate, slender secondary branches, which sometimes bear a third and fourth series, sometimes only a third. The latter series rapidly diminish in diameter, as compared with the set from which they spring, and the *ultimate* divisions are barely setaceous, almost capillary. All, to the smallest, are completely clothed with cortical cellules, without trace of articulation. *Ramelli* are only found on the ultimate setaceous branchlets, and only on their upper half; they are densely crowded, excessively slender, and very soft, but tough and not soon decaying in fresh-water, 2–3 lines long and repeatedly dichotomous, of a rosy colour. The *conceptacles* are of small size, as compared with other species, and sessile on the setaceous branchlets; their mouth not very prominent, and the nucleus not much branched. The *stichidia* are generally solitary on the ramelli, and taper from a broad base to a fine point. The *colour* is a rosy-red, sometimes purplish. The *substance* is tough, and notwithstanding the great softness and lubricity of the whole frond, it may be kept for a considerable time in fresh-water without decomposing. In drying, this plant adheres very closely to paper.

The genus *Dasya* reaches its maximum of development on the Australian coasts, and among the many species there abounding the present may rank as the most softly beautiful and flowing. Our figure merely represents one of the lateral branches of a frond, which, fully displayed, would cover a sheet of double-elephant paper. It is best seen however floating in clear water, where every cobwebby filament stands apart, greatly increasing the feathery character.

Among the Australian kinds it is perhaps nearest to *D. villosa*, but besides differences in the ramification and fruit, it abundantly differs in *substance*. *D. villosa* rapidly dissolves and falls to pieces if thrown into fresh-water; but *D. hapalathrix* may be steeped with little injury for a couple of days. *D. villosa* is gelatinoso-cartilaginous; *D. hapalathrix* tough, though very soft. Both vary in colour, but *D. hapalathrix* is usually the brightest.

Fig. 1. DASYA HAPALATHRIX; one of the lateral branches, and a fragment of the stem, *the natural size*. 2. A ramulus with conceptacles. 3. A conceptacle. 4. A ramulus with stichidia. 5. A stichidium:—the latter figures more or less *magnified*.

Plate LXIII.



Vincent Brooks Imp.

PLATE LXXXIX.

EPYMENIA MEMBRANACEA, *Harv.*

GEN. CHAR. *Frond* below ribbed and caulescent, above expanded in flat, forked laminæ, composed of two strata; the *medullary* of oblong, coloured cells; the *cortical* of vertically seriated, minute cellules. *Fructification* borne on proper fruit-leaflets, springing from the laminæ: 1, *favellæ* seated on a basal placenta, within a thick, hemispherical pericarp; 2, cruciate *tetraspores*, dispersed among the cortical cellules of the leaflet.—EPYMENIA (*Kütz.*), from επι, *upon*, and ὑμην, *a membrane;* because the fructification is *epiphyllous.*

Frons inferne costata et caulescens, sursum in laminas planas subdichotomas expansa, stratis duobus contexta; strato medullari cellulis majusculis oblongis coloratis, corticali cellulis minimis verticaliter ordinatis composito. Fructus utriusque generis in sporophyllis propriis evolutus: 1, *favellæ intra pericarpium hemisphærice elevatum crassum ad placentam basalem sessiles;* 2, *tetrasporæ sparsæ, cruciatim divisæ.*

EPYMENIA *membranacea;* frond stipitate, ribbed below, the stipes winged, cuneate upwards, and expanding into a repeatedly dichotomous, flabelliform, thinly but rigidly membranous lamina; axils rather narrow, apices narrowed to an obtuse point; conceptacles one or two on each fruit-leaflet.

E. membranacea; *fronde stipitata inferne costata; stipite alato sursum cuneato in frondem repetite dichotomam flabellatam tenui-membranaceam rigidiusculam expanso; axillis angustis, apicibus subangustatis obtusiusculis; cystocarpiis in phyllo solitariis binisve.*

EPYMENIA membranacea, *Harv. in Hook. Fl. Tasm. v.* 2. (*ined.*).

HAB. In the Tamar, at Georgetown, Tasmania, *W. H. H., C. Stuart.*

GEOGR. DISTR. Tasmania.

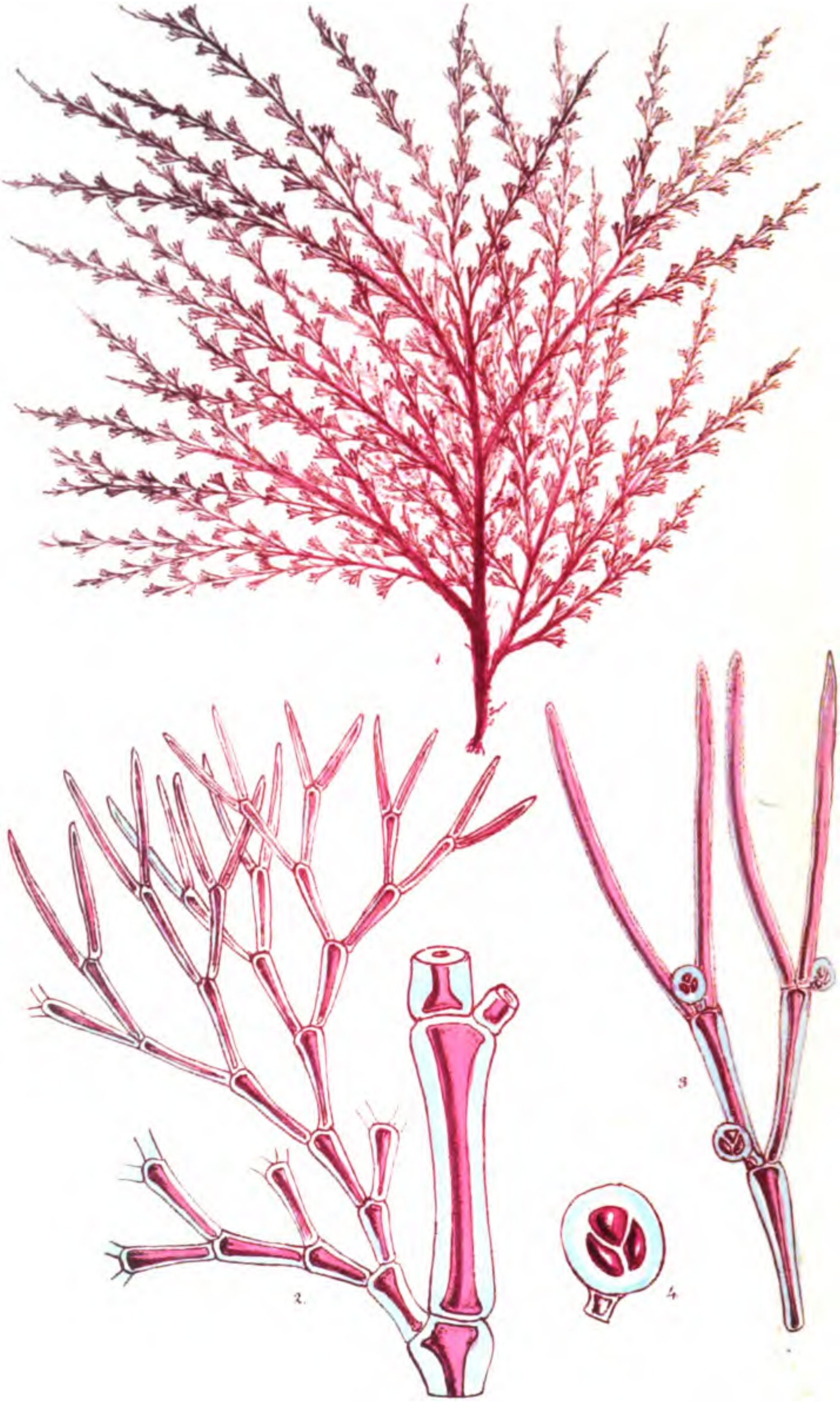
DESCR. *Root* a hard disc. *Fronds* somewhat tufted, 6–10 inches long, and as much in expansion. *Stipes* 1–2½ inches long, about a line broad, rigid and firm, cylindrical, with a narrow wing at each side. Upwards the wing widens into the cuneate base of the lamina, and the thick and rigid stipes degenerates into a midrib, and is soon lost in the widening membrane. The lamina is 4–5 times regularly forked; its general outline is flabelliform, and its segments are broadly linear, ¼–¾ or nearly 1 inch broad, separated by narrow axils, and slightly tapering upwards to an obtuse but not abrupt point. The *substance* of the frond is very thin and semitransparent, but rigid, without any tendency to adhere to paper in drying. The *colour*, when fresh, is rather deep, somewhat purpurascent red; fading, on exposure, to a dull reddish-brown, and bleaching to a dirty-white. The cellular *structure* is very dense; all the cells of the medullary layer are filled with endochrome. The *conceptacles* are formed, one or two together, on superficial, cuneate or obovate leaflets, ¼–⅓ inch long; their pericarp is very thick, and the chamber much larger than the nucleus, which (perhaps) is immature in our specimens. *Tetraspores* unknown.

To the casual observer this plant will appear very like the common European *Rhodymenia palmata*, better known perhaps by its vulgar name *Dulse* or *Dillisk;* but obvious differences may be found on more careful examination. The most obvious is the rigid, winged stipes, passing into a vanishing rib in the lower part of the frond. There is no trace of such a stipes or rib in *R. palmata*. A difference in fruit, and in the intimate structure of the frond, further obliges us to place these two plants, so like externally, not only in different genera, but in different families.

The genus *Epymenia* was founded by Kützing on a plant from the Cape, which had been referred by Greville to *Phyllophora*. That species (*E. obtusa*, Kütz.) is nearly related to the Alga now figured, but is of much brighter colour, of thicker substance, with broader, more wedge-shaped, and much more abruptly obtuse apices. It has been found in New Zealand, and may perhaps occur on the south coast of Tasmania, but has not yet been recorded. A third species (*E. acuta*) is found in New Zealand. The "*Rhod. variolosa*," of 'Flora Antarctica,' referred to *Epymenia* by Kützing, does not belong to this genus.

Fig. 1. EPYMENIA MEMBRANACEA. 2. Fragment of a fruit-bearing frond:—both of the *natural size*. 3. Section through a pericarp, showing the enclosed *favella*,—*magnified*.

Plate XC



Vincent Brooks Imp.

PLATE XC.

CALLITHAMNION LICMOPHORUM, *Harv.*

GEN. CHAR. *Frond* filiform, branched, articulated, monosiphonous, the stem and branches (in many species) at length thickened internally, or coated externally with decurrent filaments; ramuli always pellucidly articulate and monosiphonous. *Fructification:* 1, *favellæ* generally in pairs, axillary or sessile on the branches, naked, containing numerous angular spores; 2, *tetraspores* naked, sessile or pedicellate, distributed on the ramuli, generally triangularly parted.—CALLITHAMNION (*Lyngb.*), from καλλις, *beautiful,* and θαμνιον, *a little shrub.*

Frons filiformis, ramosa, articulata, monosiphonia, caule ramisque majoribus (in pluribus) demum fibris decurrentibus interne vel externe evolutis corticatis v. firmatis; ramulis semper pellucide articulatis. Fruct.: 1, *favellæ binatæ, axillares v. ad ramos sessiles, nudæ, sporas numerosas angulatas foventes;* 2, *tetrasporæ nudæ, ad ramulos sessiles v. pedicellatæ, triangulæ v. cruciatim divisæ.*

CALLITHAMNION *licmophorum;* frond flabelliform, subdichotomously decompound, the stem and principal branches at length coated externally with decurrent, interwoven, and anastomosing fibres; branches spreading to all sides, virgate, set throughout with alternate, flabellate ramuli; ramuli dichotomous, fastigiate, their articulations 4–5 times as long as broad, swollen upwards, their apices subacute; tetraspores pedicellate, solitary in the axils of the ramuli.

C. licmophorum; *fronde flabelliformi subdichotome decomposita, caule ramisque majoribus demum fibris decurrentibus intertextis anastomosantibusque dense velatis; ramis quoquoversum egredientibus virgatis strictis ramulis flabellatis alternis crebre ornatis; ramulis brevibus dichotomo-multifidis fastigiatis, articulis diametro 4–5-plo longioribus sursum incrassatis, apicibus acutiusculis; tetrasporis pedicellatis ad axillas ramulorum solitariis.*

CALLITHAMNION licmophorum, *Harv. Alg. Austr. Exsic. n.* 536.

HAB. Shortland's Bluff, Port Phillip; and Philip Island, Western Port, Victoria, *W. H. H.*

GEOGR. DISTR. South coasts of Australia.

DESCR. *Root* a mat of fibres, surrounding a central disc. *Fronds* loosely tufted, 4–6 inches high, and fully as much in the expansion of the branches, irregularly divided from the base in a subdichotomous manner, but with the branches and their divisions spreading in all directions. In the young plant the whole frond is pellucidly articulate; nor do the joints of the stem or branches ever become opaque, or "corticated" with internally developed cellules. But they soon are coated *externally* with decurrent fibres, originating at the insertion of the ramuli, and extending downwards, clasping round the branch or stem, and at length enveloping it in a filamentous sheath. The shaggy-coated, rope-like stem is then often a line or more in diameter; the major branches ½–⅓ line, and the lesser ones proportionately less thick, as the coat of fibrils is less developed. The ultimate branches generally remain nude; they are remarkably straight and rod-like, about 2 inches long, and bear at every node, in alternate but laxly spiral order, short flabelliform ramuli. The ramuli are 1–2 lines long, several times forked, their segments of equal length. The articulations of the branches are 5–8, of the ramuli 4–5 times as long as broad; the cell-walls are thick and gelatinous, and the endochrome narrow. *Tetraspores* are borne in the forks of the ramuli, on very short pedicels. The *colour* is a clear pinky-red, rapidly discharged in fresh-water. The *substance* is soft; and the plant very quickly decomposes in the air or in fresh-water; and in drying adheres very strongly to paper.

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The genus *Callithamnion* is a very large one, dispersed through almost all seas, having many representatives in Australia, and comprising several more or less distinctly marked subtypes or subgenera. Notwithstanding the wide differences of habit, and of degree of development between the several species, I prefer keeping the genus nearly as left to us by Lyngbye, and as retained by J. Agardh, to breaking it up into several. The species now figured is obviously allied to the European *C. corymbosum*, and to the Australian *C. flabelligerum*, *C. griffithsioides*, etc., but by the characters of its stem it would fall under the "*Spongoclonium*" of Sonder; a genus proposed to be founded on my *Call. tingens* (Alg. Exsic. Austr. n. 508), and to which several other Australian species may be referred. All these agree in having their stems and larger branches at least, coated *externally* with a spongy mass of interwoven filaments, increasing with the age of the specimens, and obviously of the same nature as the *internal* filaments that in other species cause *opaque* stems and branches, and define Kützing's genus *Phlebothamnion*. There is this objection to employing as a generic character these supplementary fibres, whether internal or external, namely, that they vary in amount according to the age of the individual specimen. Hence, a young frond may be referable to a *genus* different from that of its parent frond; or, the *branches* of a specimen may be "*Callithamnion*" and the *stem* either "*Phlebothamnion*" or "*Spongoclonium*."

Fig. 1. CALLITHAMNION LICMOPHORUM,—*the natural size*. 2. A dichotomous branchlet, and a single joint of a branch. 3. Tip of a branchlet, with axillary tetraspores. 4. A tetraspore:—the latter figures variously *magnified*.
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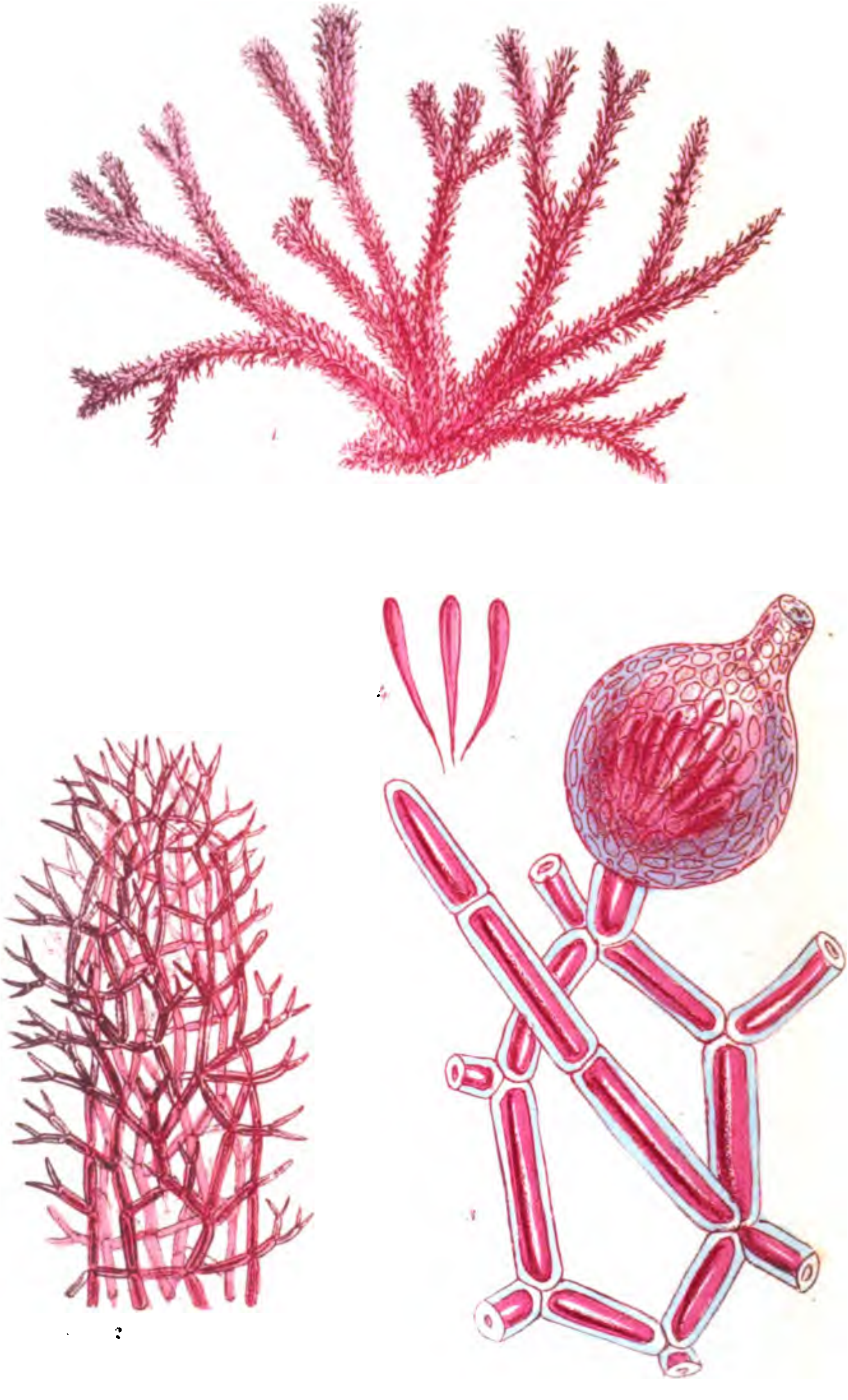


Vincent Brooks, Imp.

PLATE XCI.

HALODICTYON AUSTRALE, *Harv.*

GEN. CHAR. *Frond* a tubular, simple or forked network, formed by numerous, inosculating, confervoid filaments; the meshes irregular, emitting at the angles free, horizontal ramelli. *Fructification:* 1, urceolate *ceramidia*, containing a tuft of pear-shaped spores; 2, lanceolate *stichidia*, containing a single or double row of *tetraspores*.—HALODICTYON (*Zanard.*), from ἅλς, *the sea*, and δικτυον, *a net.*

Frons (quasi reticulum tubulosum, simplex v. furcatum) ex filis confervoideis numerosis angulatim anastomosantibus conflata; maculis irregularibus, ramellos horizontales breves ad angulos emittentibus. Fruct.: 1, *ceramidia urceolata, fasciculum sporarum pyriformium includentia;* 2, *stichidia lanceolata, tetrasporas triangule divisas uni-biseriatas foventia.*

HALODICTYON *australe;* network cylindrical, repeatedly forked, bristling with excurrent, free ramuli; filaments capillary, the primary articulations cylindrical, about four times as long as broad; ceramidia pedicellate, ovate-urceolate, with a prominent orifice.

H. australe; *reticulo terete dichotomo ramulis liberis excurrentibus furcatis dense velato; filis capillaribus, articulis primariis cylindraceis diametro 4-plo longioribus; ceramidiis pedicellatis ovato-urceolatis, ore prominulo.*

HANOWIA australis, *Sond. in Mohl and Sch. Bot. Zeit.* 1845, *p.* 52. *Pl. Preiss. v.* 2. *p.* 170. *Harv. in Trans. R. I. Acad. v.* 22. *p.* 558. *Alg. Austr. Exsic. n.* 115.

HAB. Western Australia, *Preiss!* Fremantle, *W. H. H.*, *G. Clifton.*

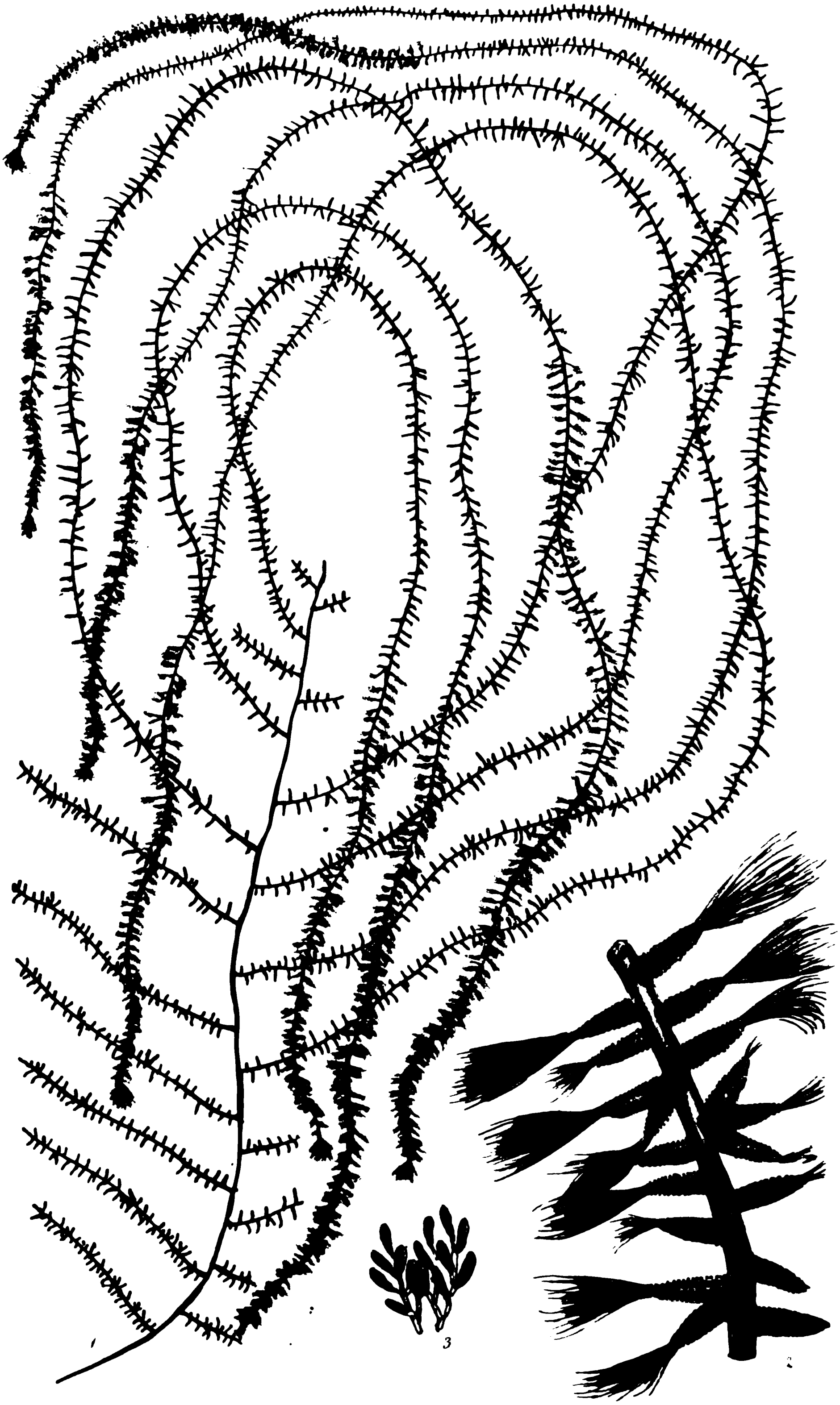
GEOGR. DISTR. West coast of Australia.

DESCR. *Fronds* originating in a sponge-like, amorphous network of anastomosing filaments; several from the same base, cylindrical, 1–3 inches long, 2–3 lines in diameter, subsimple, or once, twice, or thrice forked. The cylindrical frond is formed of several parallel, longitudinal, branching filaments, whose branchlets anastomose into the polygonal meshes of the tubular network; forming five- or six-sided meshes. From the angles of these meshes are given off externally, short spreading or horizontal, free, once or twice forked ramelli, which spread in all directions, and give the frond, to the naked eye, a shaggy aspect. The whole frond is pellucidly articulated and composed of monosiphonous filaments; the articulations of the meshes are 3–4 times as long as broad, those of the ramuli about the same, or shorter. The *ceramidia* are borne on the free ramuli, the fertile ramulus being shortened to a single joint; they are somewhat inflated, with a projecting orifice; the spores are very narrow-pyriform, or rather clavate. The *colour* is a clear red, discharged in fresh-water; in drying it becomes darker and browner. The *substance* is membranous and juicy, rather quickly decomposing; and in drying the plant adheres strongly to paper.

At Plate XXXVII. of our first volume we have figured two species of *Halodictyon;* one of them furnished with tetrasporic fruit; and we now present the third Australian species, furnished with its *cystocarpic* fruit, clearly showing that the genus belongs to the *Rhodomelaceæ*, and differs from *Dasya* chiefly in the structure of the frond. It is, so to say, as if the *ramelli* of a *Dasya*, removed from the polysiphonous axis, were formed into a tubular network, or we may compare it to *Thuretia* deprived of the internal framework or skeleton. When this plant was first observed, Sonder, by whom it was described, judging by the Callithamnoid structure of its filaments, referred it to *Ceramiaceæ*, proposing for it the genus *Hanowia*. Agardh, while adopting that supposed genus and retaining it among *Ceramiaceæ*, noticed its structural "analogy, if not affinity," with *Halodictyon*, a genus of *Rhodomelaceæ*, already founded on an Adriatic Alga. Our knowledge of the fructification of the Australian species is due to Mr. George Clifton, to whose many discoveries among the Algæ of Western Australia I have so frequently to refer, and to whom I owe the only fruit-bearing specimen of this curious Alga that I possess.

Fig. 1. HALODICTYON AUSTRALE,—*the natural size*. 2. Portion of a branch of the network. 3. A mesh, a ramulus, and a ceramidium. 4. Spores:—the latter figures more or less *magnified*.

Plate VI.



Vincent Brooks Lith.

PLATE XCII.

SPOROCHNUS APODUS, *Harv.*

GEN. CHAR. *Frond* filiform, solid, pinnately decompound. *Receptacles* pod-shaped, pedicellate (rarely sessile), crowned with a tuft of soft hairs, and densely covered with whorled, branching, sporiferous filaments. *Spores* oblong, attached to the filaments.—SPOROCHNUS (*Ag.*), from *σπορος, a seed,* and *χνοος, wool;* because tufts of soft hairs crown the fructification.

Frons filiformis, solida, pinnatim ramosa. Receptacula siliquæformia, sæpissime pedicellata, apice comosa, paranematibus ramosis horizontalibus verticillatis densissime vestita. Sporæ obovoideæ, ad paranemata laterales.

SPOROCHNUS *apodus;* frond setaceous; the branches very long, subsimple; receptacles sessile, linear-oblong, subacute, horizontally patent, densely set.

S. apodus; *fronde setacea, ramis longissimis simpliciusculis; receptaculis sessilibus lineari-oblongis subacutis horizontaliter patentibus numerosissimis crebrisque.*

SPOROCHNUS apodus, *Harv. in Hook. Fl. Tasm. v.* 2. *p.* 287.

HAB. At Georgetown, Tasmania; very rare, *W. H. H.*

GEOGR. DISTR. Tasmania.

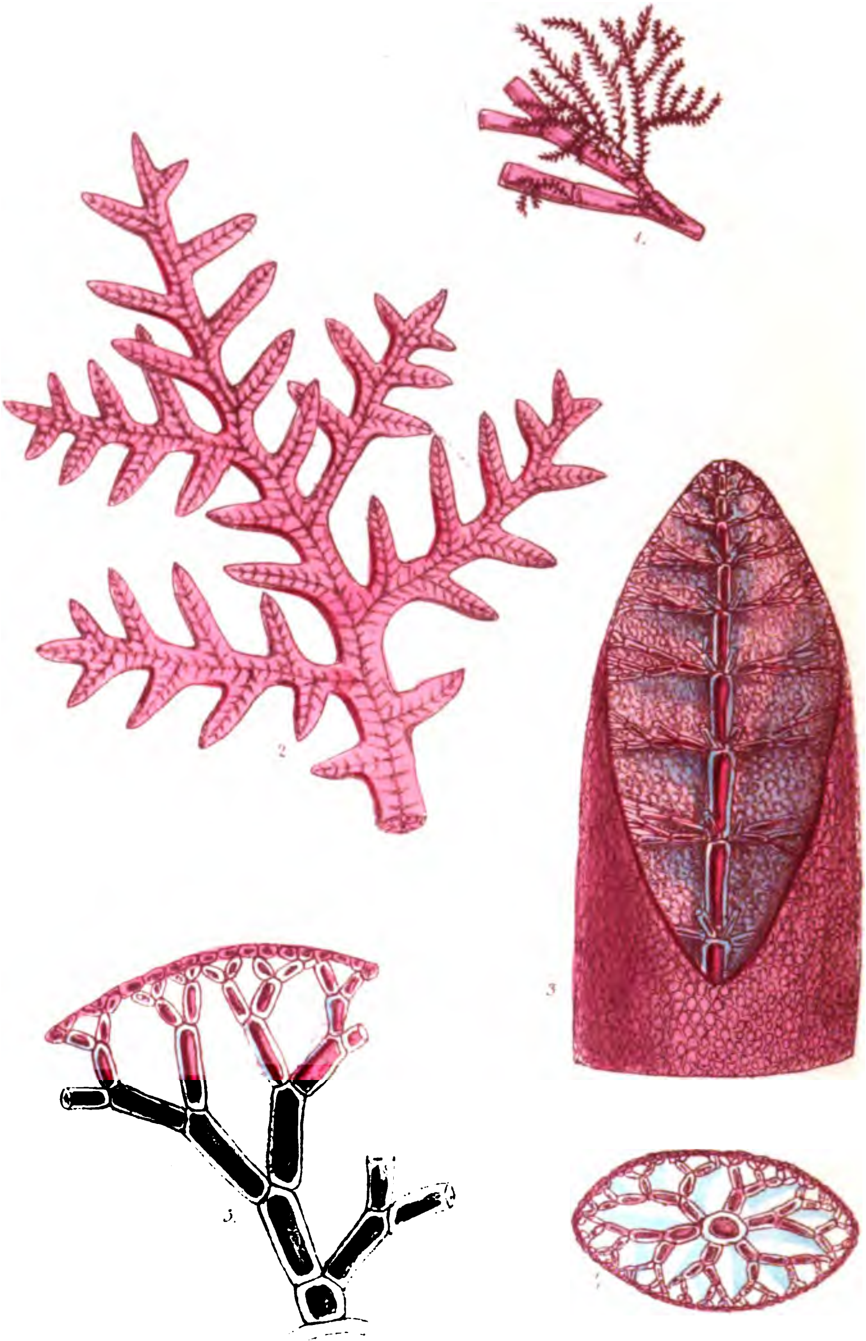
DESCR. *Root* and base of the frond unknown. *Stem* as thick as hog's-bristle, of unknown length, set at intervals of ¼–½ inch with alternate branches. *Branches* very long, 1–1½ feet in length, thread-like, attenuated to the extremity, either quite simple or emitting a few slender, irregular, and more or less barren branchlets, 1–2 inches in length. The *branches* are tipped with a rather small brush-like tuft of filaments, and throughout their whole length densely set with horizontally patent spine-like receptacles. These receptacles are 1–2 lines long, quite sessile, broadest at base, subcylindrical, but slightly tapering upwards, and ending in a narrow, gland-tipped point, from which springs a tuft of soft, articulated, deciduous, byssoid fibres. The *receptacles* are of the ordinary structure, consisting of irregularly branched filaments, bearing spores, and whorled round a cylindrical axis. The *colour* is dark-olive when dry, paler and more tawny when fresh. The *substance* is soft; and the plant adheres to paper in drying.

I am not partial to proposing new species on the faith of solitary specimens, yet there are some cases in which it is undoubtedly right to do so. Our opening Plate of the present Volume (*Claudea Bennettiana*) is a striking instance of a very strongly characterized plant, of whose distinctness from the previously known species there can be no question, and yet which is only known by a small fragment once dredged in a locality which has been repeatedly searched in vain for further data.

The *Sporochnus* now figured is also founded on a single specimen, that occurred among drift-weeds above Georgetown, Tasmania; where *Sp. comosus*, in many varieties, is profusely common. If the present be one of these varieties, it is at least a most strongly marked one, differing not only from all states of *S. comosus*, but from every other species of *Sporochnus*, in the complete absence of *pedicel* to the receptacle. On this character alone therefore I venture to propose the species; other differences of habit will be seen when we figure *S. comosus*.

S. apodus is further interesting as being the link that connects *Sporochnus* with *Nereia;* and reduces the difference between these genera to the degree of evolution of the axis round which the spore-threads are whorled. In *Nereia* the axis is punctiform or discoid, and the result is a conical or hemispherical receptacle; in *Sporochnus* it is filiform, and the result an oblong or cylindrical receptacle. These two genera of Algæ therefore have a similar analogy with each other, as have the proteaceous genera *Dryandra* and *Banksia*.

Fig. 1. SPOROCHNUS APODUS,—*the natural size.* 2. Part of a branch, with receptacles. 3. Spore-threads from the receptacle:—the latter figures variously *magnified*.



Vincent Brooks Imp.

PLATE XCIII.

GATTYA PINNELLA, *Harv.*

GEN. CHAR. *Frond* distichous, pinnatifid, hollow, tubular, with a membranous periphery, and an articulated, monosiphonous axile filament. *Axile filament* articulate, callithamnioid, emitting at each joint whorled, dichotomous ramelli, whose tips, cohering together, form the membranous periphery of the frond. *Fruit* unknown.—Named in honour of Mrs. Gatty, of Ecclesfield, Yorkshire, a diligent explorer of British Algæ and marine animals, and author of 'A Hornbook of Phycology,' etc. etc.

Frons disticha, pinnatifida, tubulosa (cava), peripherio membranaceo axique monosiphonio articulato composita. Filum centrale articulatum, callithamnioideum, ad genicula ramellos verticillatos dichotomos emittens, quorum apicibus arcte cohærentibus peripherium membranaceum frondis constructum est.

GATTYA *pinnella,* Harv.

GATTYA pinnella, *Harv. in Trans. R. I. Acad. v.* 22. *p.* 555; *Alg. Exsic. Austr. n.* 422.

HAB. Parasitical on Algæ and Corallines. Rottnest Island, *W. H. H.*

GEOGR. DISTR. Western Australia.

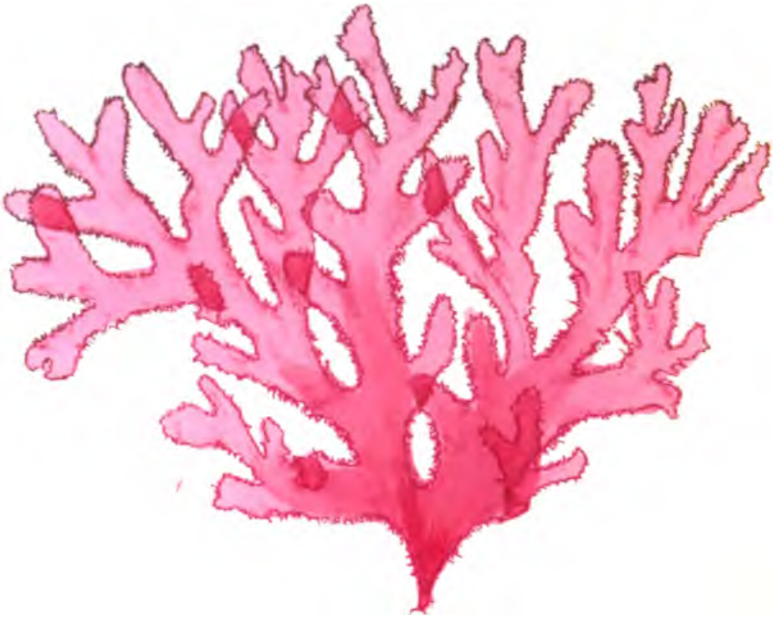
DESCR. *Fronds* rising from prostrate *surculi,* which are closely attached at intervals by minute discs to the surface of some Alga, afterwards free and erect, 1–1½ inch high, alternately or irregularly branched. The *branches* are perfectly distichous, of unequal lengths, long and short occurring together, and all are linear in outline and deeply pinnatifid. *Pinnules* alternate, ½ a line long, patent, broadly subulate, subacute, with blunt axils. The whole frond is tubular and hollow, but compressed, a cross section being nearly oval. The *tube* is traversed by a jointed, monosiphonous, coloured, filamentous axis, resembling the branch of a *Callithamnion;* this axis, at each joint, throws out a whorl of repeatedly dichotomous, horizontal, fastigiate *ramelli,* whose extremities alone anastomose, and thus form the enveloping membrane which constitutes the membranous covering of the frond. The whole frond is therefore composed of the axis and its appendages. When viewed under a low magnifying power (as Fig. 2), the frond appears as if midribbed and penninerved; this appearance vanishes under an increased power, and is caused by the axile filament and its ramelli being seen through the semitranslucent cellules of the peripheric membrane. No *fructification* has yet been observed. The *colour* is a dark, somewhat brownish red. The *substance* is soft, but not gelatinous, and the plant adheres firmly to paper in drying.

The elegant little Alga that forms the subject of our present Plate, appears by its structure to be entitled to rank as the type of a genus, of which, at present, it is the only known species. Until the fructification shall have been discovered, its exact place in the system cannot be clearly determined; and whether it is in future to rank near *Catenella*, or near *Endocladia* and *Gloiopeltis*, or again near *Caulacanthus*, with all of which it has points in common, remains to be seen.

It is of rather rare occurence. My specimens were generally found on *Sarcocladia obesa*, on which plant, owing to similarity of colour, they are apt to be overlooked; that selected for drawing grew on *Amphiroa anceps*.

The generic name is given in honour of the accomplished Author of 'Parables from Nature,' 'Worlds not Realized,' and other juvenile works, which deserve a still wider circulation than they have yet attained, and who has fairly earned a place in the gratitude of "Algoloquists" by her useful 'Hornbook of Phycology.'

Fig. 1. GATTYA PINNELLA, growing on *Amphiroa anceps,—the natural size.* 2. Portion of the frond,—*somewhat enlarged.* 3. Apex of a pinnule cut open to show the axile filament. 4. Transverse section of the same. 5. One of the dichotomous, horizontal ramelli:—the latter figures highly *magnified.*



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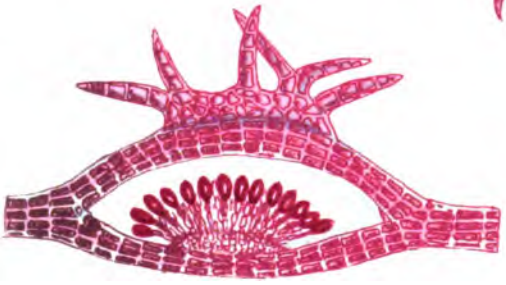

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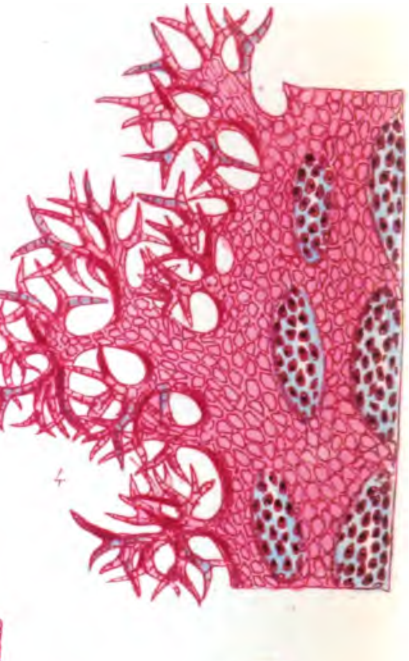

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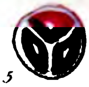

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Vincent Brooks Imp.

PLATE XCIV.

NITOPHYLLUM EROSUM, *Harv.*

GEN. CHAR. *Frond* membranaceous, expanded, areolate, unsymmetrical, nerveless or irregularly veined. *Fructification:* 1, hemispherical *conceptacles*, sessile on the frond, containing a tuft of moniliform spore-threads, on a basal placenta; 2, tripartite *tetraspores*, in definite sori or spots, scattered, or confined to some part of the frond.—NITOPHYLLUM (*Grev.*), from *nitor*, 'to shine,' and *φυλλον*, *a leaf.*

Frons membranacea, expansa, areolata, vage fissa, enervia v. basi venulis irregularibus peragrata. Fruct.: 1, *coccidia frondi sessilia, hemisphærica, fila sporifera moniliformia a placenta basali emissa foventia;* 2, *tetrasporæ triangule divisæ, in soros definitos collectæ.*

NITOPHYLLUM *erosum;* stipes minute, cylindrical, cartilaginous, passing into the cuneate base of a broadly linear, dichotomously multifid frond; laciniæ nerveless, linear, obtuse, with wide axils; margin everywhere fringed with minute dichotomo-multifid processes; conceptacles crowned with cilia; sori numerous, oval, scattered over the whole surface of the frond.

N. erosum; *stipite brevi cylindraceo cartilagineo in basi cuneata frondis mox evanescente, fronde lineari vage dichotoma, laciniis enervibus obtusis axillis rotundatis, margine processibus minutis ramosissimis dense fimbriato, coccidiis coronatis, sorisque oblongis sparsis.*

NITOPHYLLUM erosum, *Harv. Alg. Exsic. Austr. n.* 293.

NITOPHYLLUM fimbriatum, *Harv. Trans. R. I. Acad. n.* 22. *p.* 549, *non Grev.*

HAB. On Algæ and Zostera. Garden Island, *W. H. H.*, *G. Clifton.* Port Fairy, *W. H. H.*

GEOGR. DISTR. Western and southern coasts of Australia.

DESCR. *Root* a small disc. *Stipes* 1–2 lines long, setaceous, cartilaginous, passing into a nerve, which soon disappears in the cuneate base of the frond. *Frond* 1–4 inches long, nowhere more than ½ an inch wide, more or less divided, and frequently multipartite; the segments broadly linear, irregularly forked, somewhat curled or flat, patent, with wide rounded axils and blunt extremities. The *margin* in every part is closely fringed with minute multifid processes, from ¼–½ line long, divaricately forked, the ultimate processes capillary and articulate. The *membrane* is formed of 3–4 series of quadrate cells; the surface laxly areolated. *Conceptacles* irregularly scattered, not numerous on each frond, hemispherical, but crowned (always?) with forked processes resembling those of the margin; placenta not very prominent. *Sori* oblong or oval, ¼ line long, dot-like, thickly strewed over the whole surface of the lamina, or of its principal divisions. *Colour* a full deep-red, like that of *Callophyllis laciniata*. *Substance* rather thick, not very delicate; the frond adhering to paper in drying.

As far as technical characters go, this plant is amply distinguished from all others of the extensive genus to which it belongs. No other species of *Nitophyllum* has its margin so fringed with minute, repeatedly multifid processes, and this mark will forbid any one mistaking it. But this very fringe, to the eye accustomed to "*divarication of species*" among Algæ, looks suspicious, particularly as a similar ornament is found on the *conceptacles;* and I shall not be surprised if it be eventually proved that we have here but a fringed variety of some plain-bordered species unknown. The Australian phycologist is familiar with a fringed variety of *Plocamium procerum* which, had we no intermediate states to guide us, might pass for a good species.

Nitophyllum has many species, dispersed through most of the temperate zones, and a few that straggle into the tropical seas. There are several Australian kinds, but the genus is chiefly abundant to the east of Cape Northumberland and in Tasmania, where some common species attain a large size. The grandest of the *Nitophylla* however are found at Cape Horn and the Cape of Good Hope.

Fig. 1. NITOPHYLLUM EROSUM,—*the natural size.* 2. Part of a lacinia, with a conceptacle,—*not much enlarged.* 3. Vertical section of a conceptacle. 4. Frustule of frond, to show marginal fringe and sori. 5. A tetraspore:—the latter figures much *magnified.*

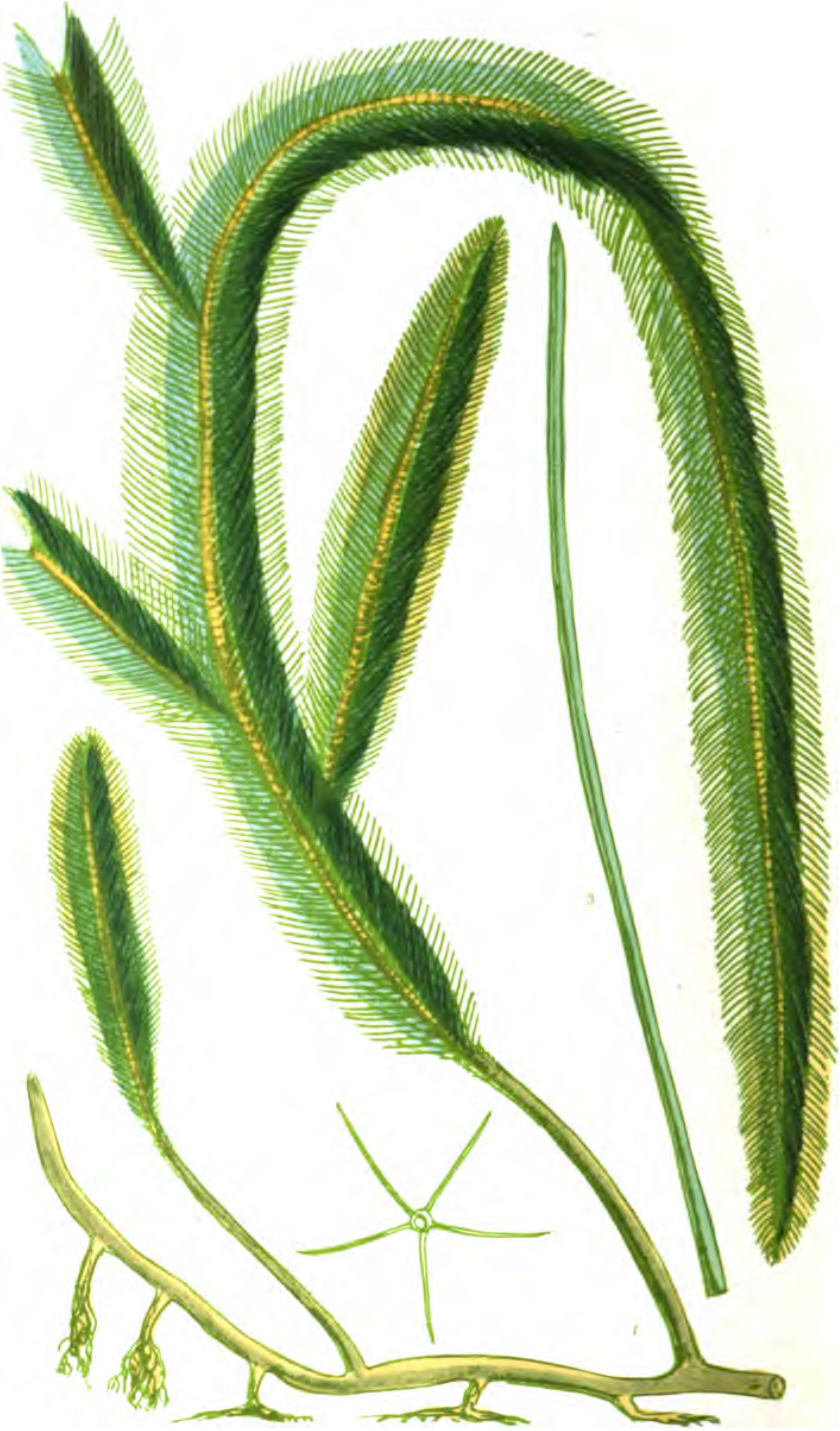
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PLATE XCV.

CAULERPA HARVEYI, *F. Muell.*

GEN. CHAR. *Frond* consisting of prostrate *surculi*, rooting from their lower surface, and throwing up erect branches (or secondary fronds) of various shapes. *Substance* horny-membranaceous, destitute of calcareous matter. *Structure* unicellular, the cell (frond) continuous, strengthened internally by a spongy network of anastomosing filaments, and filled with a semifluid grumous matter. *Fructification* unknown.—CAULERPA (*Lamx.*), from *καυλος, a stem*, and *ἑρπω, to creep:* creeping surculi are characteristic of this genus.

Frons ex surculis prostratis hic illic radicantibus et ramis erectis polymorphis constituta. Substantia corneo-membranacea. Structura unicellulosa, cellulæ membrana continua hyalina intus filis cartilagineis tenuissimis anastomosantibus firmata et endochromate denso viridi repleta. Fruct. ignota.

CAULERPA *Harveyi;* surculus robust, glabrous and glossy; fronds with long, glabrous stipites, subsimple or alternately branched; the rachis and branches thickly whorled with five-ranked, setaceous, subacute, straight or incurved, elongate ramenta.

C. Harveyi; *surculo crasso glabro nitente; fronde longe stipitata subsimplici v. alterne vage ramosa; rachide ramisque densissime ramentis setaceis elongatis simplicibus strictis incurvisque pentastichis (raro tetrastichis) onustis.*

CAULERPA Harveyi, *F. Muell. in Herb. Vict. Harv. Alg. Exsic. Austr. n.* 554.

CAULERPA filifolia, *Harv. (olim) in Herb.*

CAULERPA Brownii, *Sond. Linn. v.* 25. *p.* 660 (*non Hook. et Harv. Fl. N. Zeal. p.* 260. *t. CXXI.* A).

Var. *β. crispata;* of smaller size, and usually pale yellow-green colour; ramenta strongly incurved and frequently curled, less obviously five-ranked.

Var. *β.* crispata; *minor, luteo-virescens; ramentis incurvis crispatisve, sæpe vix et ne vix pentastichis.*

HAB. Guichen and Rivoli Bays, *Dr. Mueller.* Port Fairy, and at the Heads of Port Phillip, *W. H. H.* Var. *β.* In rockpools between tide-marks, Port Phillip Heads, and Western Port.

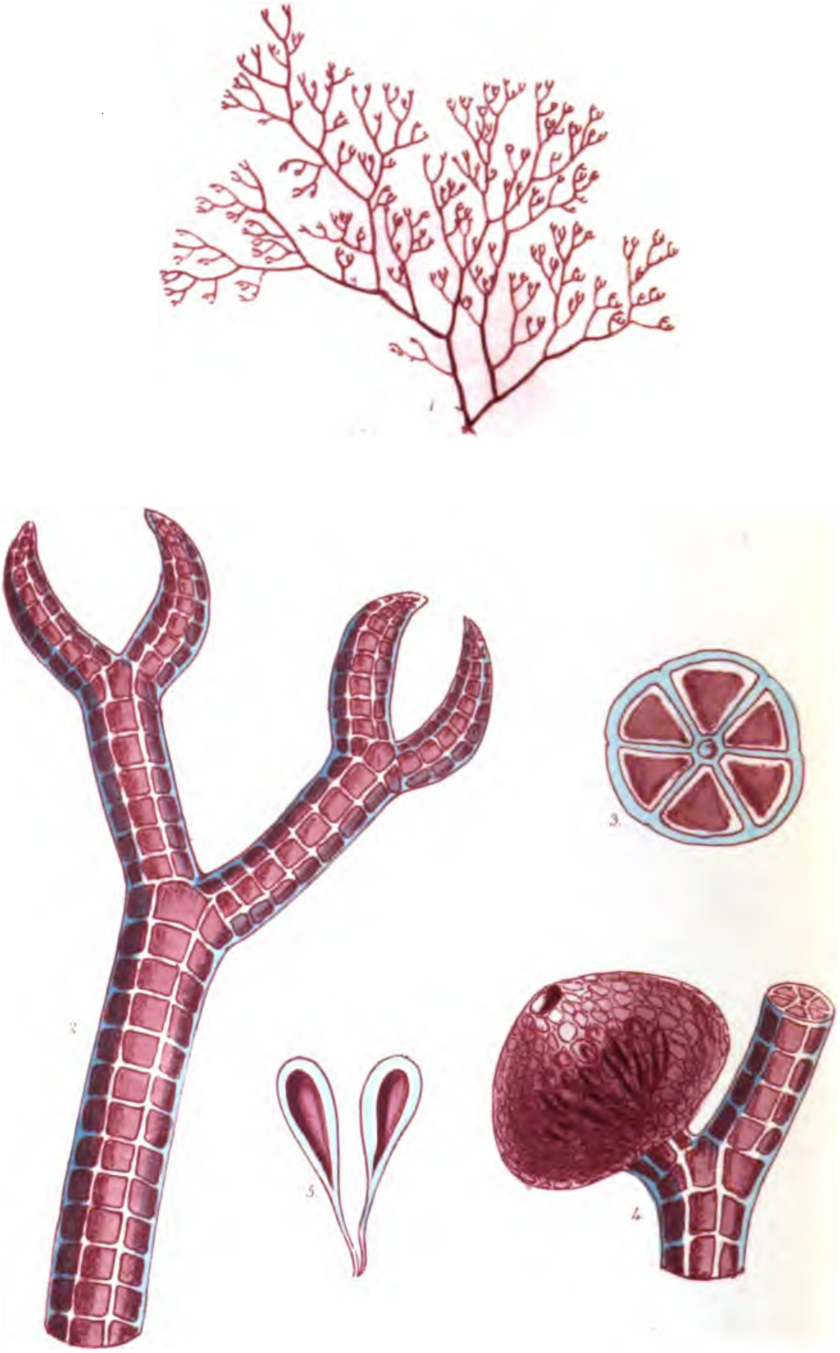
GEOGR. DISTR. South coast of Australia.

DESCR. *Surculus* several inches long, 1–2 lines in diameter, branched, quite glabrous and glossy, with stout and strong rooting processes. *Stipes* 2–3 inches high, glabrous and glossy, then passing into the leafy portion of the stem. *Stem* 1–2 feet long, simple, or furnished with few or several, irregularly inserted, virgate, lateral branches; the stem, above the stipes, and branches from their base, densely beset with closely seriated whorls of ramenta. *Ramenta* ¾–1 inch long, as thick as hog's-bristle, quite simple, cylindrical, subacute, set in five, rarely in four, equidistant ranks, which stand apart, separated by angular interspaces. Usually the ramenta are quite straight and erecto-patent, but in var. *β* they are incurved, and frequently curled and entangled, and the regularly pentastichous arrangement thus becomes somewhat obscured. The *colour* in *a* is a full deep-green, orange at the tips, and somewhat golden on the surculus and stipes; in *β* it is usually a pale yellow-green in all parts. The *substance* is not very soft, and in drying the frond imperfectly adheres to paper.

This is perhaps the finest of the Australian *Caulerpæ*. Our figure represents one of the smaller specimens. The branches are frequently numerous, and the rachis proportionally lengthened. The elegantly five-, rarely four-ranked, slender ramenta clearly mark the species. The only puzzling forms that occur are indicated under our var. *β*, and their characters seem to arise from the plant being grown in shallow and sunny pools. Extreme forms look as if they belonged to a different species, but I have intermediate states connecting the smallest and most curly with the typical state here figured. Dried specimens give no correct idea of this beautiful plant, owing to the disappearance of the peculiar five-ranked arrangement.

Fig. 1. CAULERPA HARVEYI. 2. A cross section, showing a five-ranked whorl, —both of *the natural size*. 3. A ramentum,—*magnified*.

Plate XCII



Vincent Brooks, Imp.

PLATE XCVI.

POLYSIPHONIA FORFEX, *Harv.*

GEN. CHAR. *Frond* filiform, partially or generally articulate; the joints longitudinally striate, composed of numerous cylindrial cells surrounding a central cell (sometimes coated with one or several rows of smaller cells). *Fructification:* 1, ovate or urceolate *ceramidia,* containing a tuft of pear-shaped spores; 2, *tetraspores,* immersed in swollen branches.—POLYSIPHONIA (*Grev.*), from πολυς, *many,* and σιφων, *a tube.*

Frons filiformis, plus minus articulata; articulis longitudinaliter pluristriatis, ex cellulis 4–20 *cylindraceis cellulam centralem cingentibus formatis (nunc cellulis minoribus pluriseriatis corticatis). Fruct.:* 1, *ceramidia;* 2, *tetrasporæ in ramulis ultimis uniseriatæ.*

POLYSIPHONIA *Forfex;* pale brownish-red, drying to dark red-brown; fronds subsolitary, 2–3 inches long, setaceous, cartilagineous, pellucidly articulate, repeatedly dichotomous; ultimate ramuli twice or thrice forked, the tips incurved, acute, forcipate; articulations 6-tubed, shorter than their diameter; ceramidia broadly ovate, subsessile.

P. Forfex; *pallide rufescens, siccitate fusco-rubra; frondibus subsolitariis* 2–3-*uncialibus crassis cartilagineis pellucide articulatis repetite dichotomis v. abortu scorpioideo-secundis; ramulis ultimis bis terve furcatis apice acutis forcipatis! articulis* 6-*siphoniis diametro brevioribus; ceramidiis lato-ovatis subsessilibus.*

POLYSIPHONIA forcipata, *Harv. in Trans. R. I. Acad. n.* 22. *p.* 541 (*non Kütz.*); *Alg. Austr. Exsic. n.* 171.

HAB. On Zostera and the smaller Algæ. Rottnest Island and King George's Sound, *W. H. H.,* Garden Island, Fremantle, *G. Clifton.*

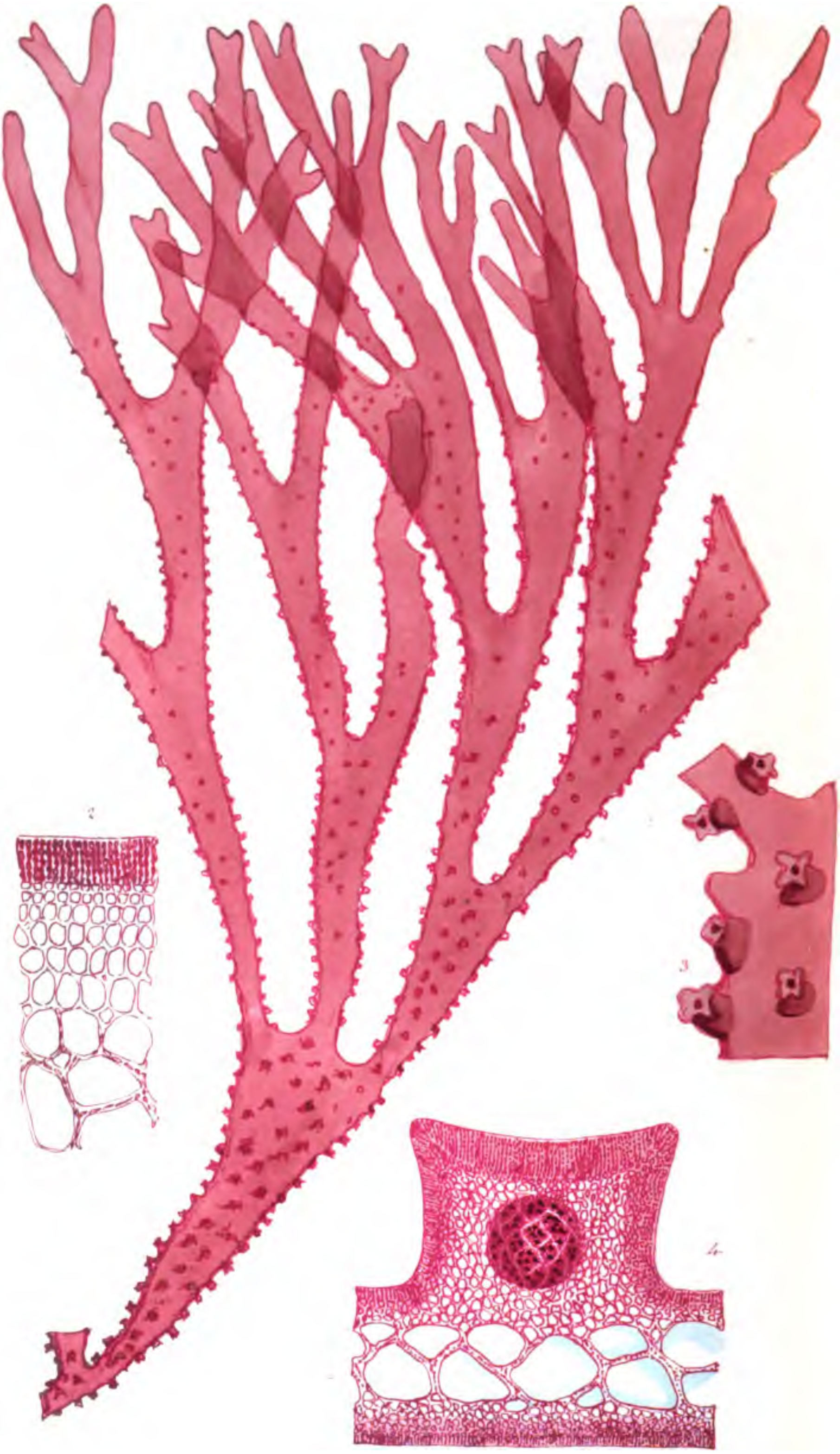
GEOGR. DISTR. Western Australia. Tanega Island, Eastern Archipelago, *C. Wright!*

DESCR. *Root* a small disc. *Fronds* erect, solitary or two or three together, but not densely tufted, 2–3 inches long, as thick as hog's-bristle, repeatedly and more or less regularly dichotomous. Old specimens are more irregular and more densely branched than our figure represents; in them the lateral branches and their divisions alone retain the dichotomous character. The smaller branchlets are most regularly forked, and the tips of the ramuli, which are acute, approach each other in pairs, like the arms of scissors. The frond is pellucidly articulate throughout, the joints being much shorter than their breadth in all parts of the frond. The *siphons* are six, the central cell very small, and the lateral view of each siphon quadrate. The *ceramidia* are sessile or nearly so, borne laterally on the branches, at some distance below the last ramifications, and are very broadly ovate, somewhat broader than long: their surface is laxly areolate. The *colour* when growing is a pale reddish-grey, more or less tinted with red; when dry it is either red-brown or very dark and blackish. The *substance* is firm, cartilaginous when recent; and in drying the plant shrinks, and adheres, but not very strongly, to paper.

A well-marked and pretty little species, of the same section as *P. cancellata*. The ramification here is almost as regularly dichotomous as in the genus *Ceramium*, and the tips of the ramuli are hooked inwards, a very unusual character in the present genus. I had formerly given it the name *forcipata*, having overlooked a species so named by Kützing. The name now given is equally appropriate.

Fig. 1. POLYSIPHONIA FORFEX,—*the natural size*. 2. Apex of a ramulus. 3. Transverse cutting of the same. 4. A ceramidium, *in situ*. 5. Spores from the same:—the latter figures *magnified*.

Plate XCII



Vincent Brooks, Imp.

Plate XCVII.

CALLOPHYLLIS CORONATA, *Harv.*

Gen. Char. *Frond* carnoso-membranaceous, flat, dichotomous, formed of two strata of cells; the *medullary* stratum of large, roundish cells, separated by a network of anastomosing cellules; the *cortical* of vertical, moniliform filaments. *Fructification:* 1, half-immersed or superficial, frequently marginal *conceptacles*, containing within a thick, closed pericarp, a compound nucleus, consisting of several nucleoli or masses of spores; 2, cruciate tetraspores, dispersed through the cortical layer.—Callophyllis (*Kütz.*), from *καλος*, *beautiful*, and *φυλλον, a leaf.*

Frons carnoso-membranacea, plana, dichotoma, stratis duobus contexta; strato medullari cellulis magnis rotundatis reticulo cellularum anastomosantium cinctis, corticali filis verticalibus moniliformibus constante. Fruct.: 1, *cystocarpia semi-immersa v. superficialia, sæpius marginalia, intra pericarpium crassum clausumque nucleolos sporarum plures foventia;* 2, *tetrasporæ sparsæ, cruciatim divisæ.*

Callophyllis *coronata;* frond thickish, irregularly dichotomous, with narrow axils; segments linear-cuneate, very long, repeatedly forked, the apices narrow, not fastigiate; conceptacles very numerous, marginal and discal, prominent, crowned with 3–4 blunt, short horns.

C. coronata; *fronde carnosa crassiuscula vage dichotoma, axillis angustis, laciniis lineari-cuneatis longissimis pluries furcatis, apicibus angustatis non fastigiatis; cystocarpiis numerosissimis marginalibus et in disco sessilibus truncatis cornibus* 3–4 *obtusis coronatis.*

Callophyllis coronata, *Harv. Alg. Exsic. Austr. n.* 406.

Hab. At Port Phillip Heads, rare, *W. H. H.*

Geogr. Distr. As above.

Descr. *Root* a flat, fleshy disc. *Fronds* one or several from the same base, two feet or more in length, very much divided, none of the laciniæ more than an inch wide, and the majority of less breadth. The branching is irregularly dichotomous, the principal segments frequently emitting marginal, forked or irregularly digitate secondary segments. All the divisions and subdivisions are cuneate at base, but nearly linear for the greater part of their length; the apical lobes are narrow, not remarkably obtuse, and sometimes subacute, irregular in length, and never fastigiate. The *cystocarps* are extremely abundant, closely set along the margin, and also sprinkled over the surface of the principal segments; they are truncate cones, nearly half a line in height, with a depression or umbilicus at top, surrounded by usually

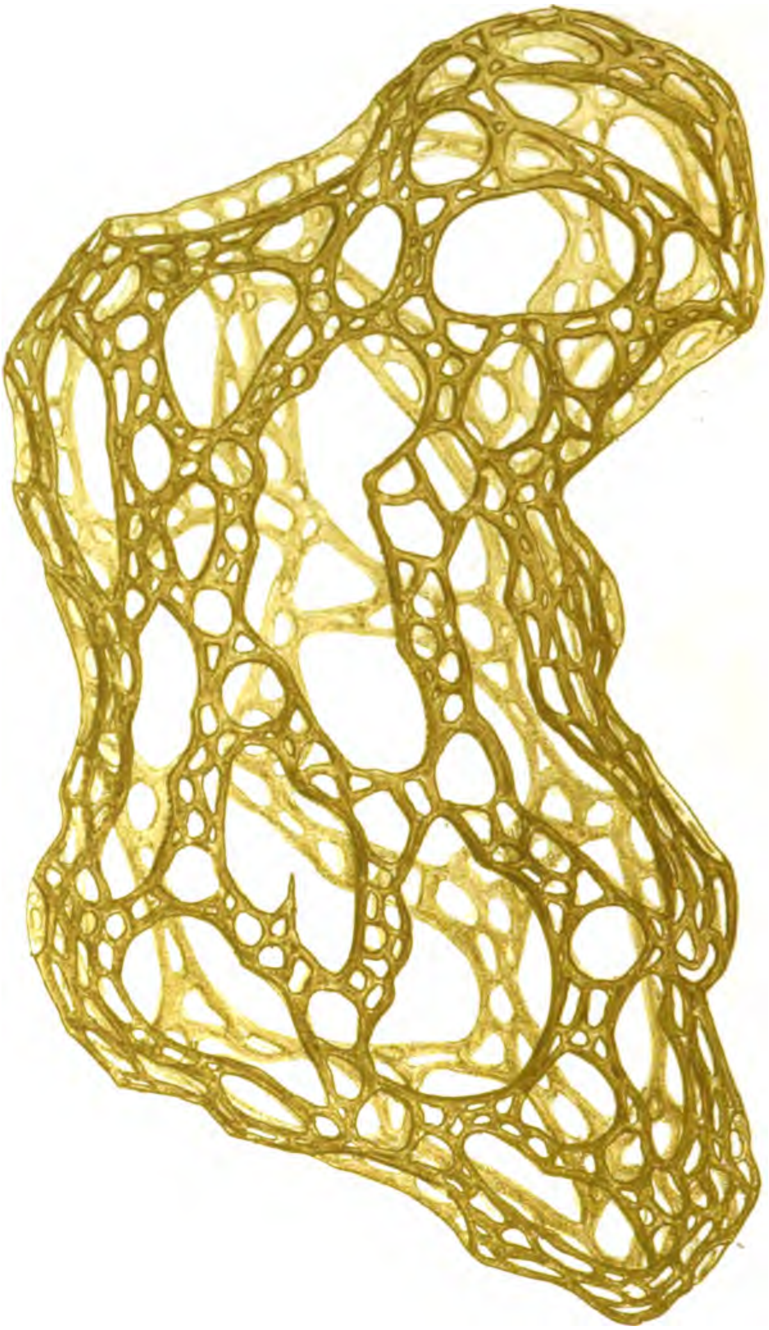
four, short, blunt, spreading horns. The *colour* is a full, but not a bright red, becoming paler and duller in drying. The *substance* is thick, between fleshy and cartilaginous, soft, elastic, and shrinking in drying. When dry this plant adheres strongly to paper.

A fine species, readily known from all others of the genus *Callophyllis* by the form and appendages of the conceptacles, which resemble externally those of a *Horea,* but differ in internal structure and in the nature of the nucleus. The general habit of the ramification is that of *Callophyllis,* and the structure of the frond agrees tolerably with that of typical species; but the peculiar intermediate network of slender filaments, which ought to separate the large cells of the medullary layer, is not well developed. I do not however know any established genus to which the present plant is so nearly allied as to *Callophyllis,* and do not consider the characters which separate it from *C. coccinea* (the commonest Australian type) to be of generic moment.

It is among the rarer of Victorian Algæ; and as yet I have only seen the few specimens which I collected about Christmas, 1854.

Fig. 1. A branch of CALLOPHYLLIS CORONATA,—*the natural size.* 2. Section, to show structure,—*highly magnified.* 3. Small portion of frond, with conceptacles *in situ,*—*slightly enlarged.* 4. Section through a conceptacle and the frond,—*magnified.*

Plate XII.



[illegible]

Ser. MELANOSPERMEÆ. Fam. *Dictyotaceæ.*

PLATE XCVIII.

HYDROCLATHRUS CANCELLATUS, *Bory.*

GEN. CHAR. *Frond* membranaceous, bag-shaped, hollow, pierced with roundish holes, which dilate more and more, until the plant becomes a clathrate network. Margin of the apertures involute. "*Spores* minute, globose, collected into dot-like, scattered, innate *sori*, accompanied by club-shaped paranemata," *Mont.*—HYDROCLATHRUS (*Bory*), corruptly formed from, *ὕδωρ*, *water*, and *clathrus*, *a lattice.*

Frons membranacea, saccata, cava, foraminibus pertusa, demum reticulato-clathrata; margo foraminum involutus. Sori punctiformes, sparsi.

HYDROCLATHRUS *cancellatus*, Bory.

HYDROCLATHRUS cancellatus, *Bory, Dict. Class. Hist. Nat. v.* 8. *p.* 419. *Mont. Alg. Alger. p.* 36; *Canar. Crypt. p.* 144; *and Voy. Pôl. Sud, p.* 42. *Duby, Bot. Gall. p.* 960. *Dcne. Pl. Arab. p.* 138. *Harv. Ner. Bor. Amer. part* 1. *p.* 120. *t.* 9 *A (the young plant).*

HALODICTYON cancellatum, *Kütz. Phyc. Gen. p.* 336.

ASPEROCOCCUS clathratus, *J. Ag. Sp. Alg. v.* 1. *p.* 75.

ASPEROCOCCUS cancellatus, *Endl. Sond. Pl. Preiss. v.* 2. *p.* 156.

ENCOELIUM clathratum, *Ag. Sp. Alg. v.* 1. *p.* 412. *Kütz. Sp. Alg. p.* 552.

HAB. Common near Fremantle, Western Australia, *Preiss, Backhouse, W. H. H., G. Clifton, etc.*

GEOGR. DISTR. Common throughout the tropical and subtropical regions of both hemispheres. Red Sea. On the shores of Bretagne, *Bory.*

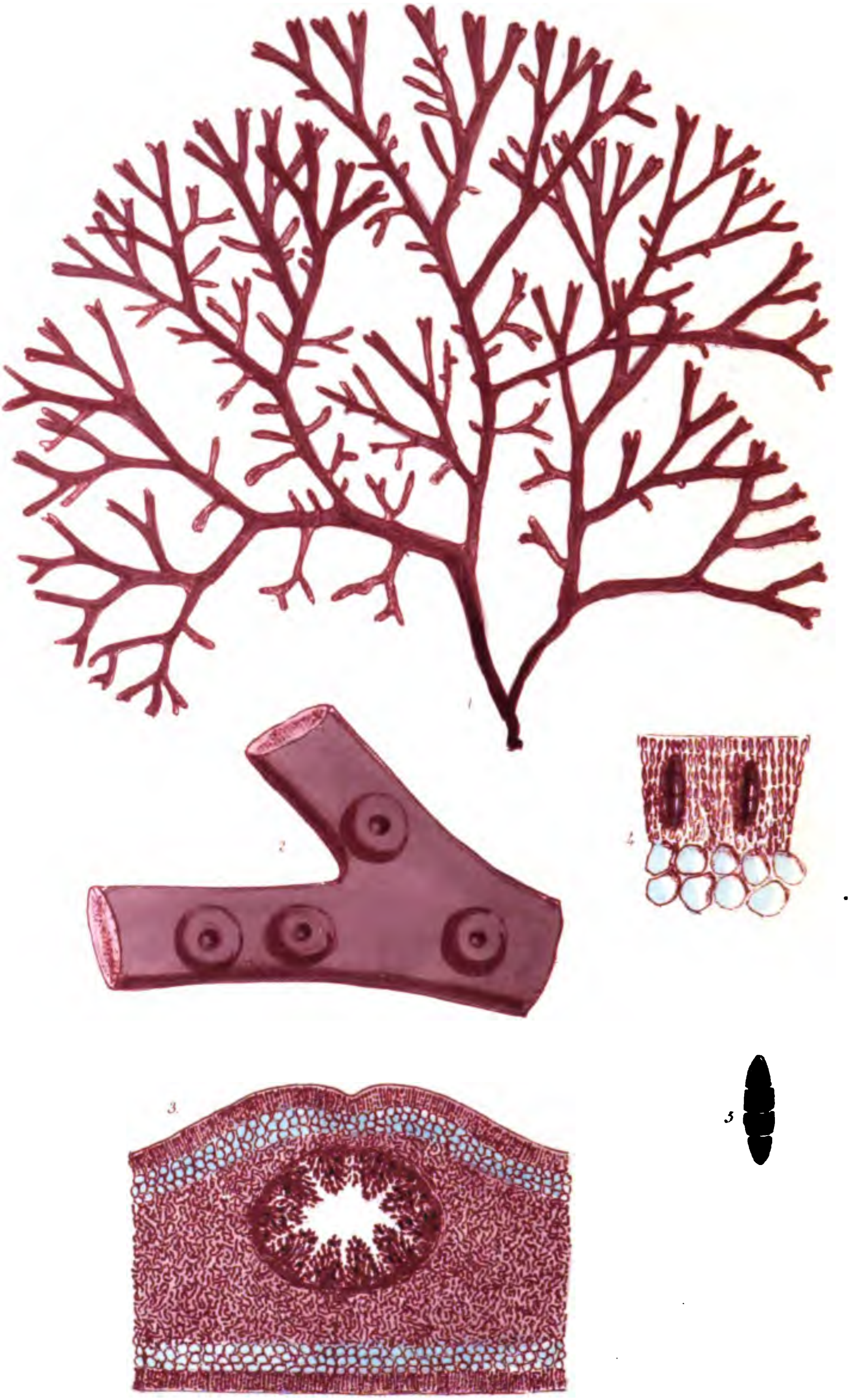
DESCR. *Fronds* of very irregular form, oblong or sinuous, from 2–6 inches long or more, heaped together in widely spreading patches, and adhering to rocks by their lower surface, and to one another by their sides. The young fronds, from a very early age, are pierced with round holes. At first these holes are of small size, and often laterally compressed, but as the membrane expands, the holes widen, and in the full-grown plant (represented in our Plate) the apertures frequently are one or more inches in diameter and of irregular shape; new holes open in the interspaces, and the frond is converted into a delicate, bag-shaped network. The margin of each hole is strongly involute. The *substance* is thickish, crisp when quite recent, and in that state very fragile; but on exposure to the air it soon softens. The young fronds decompose rapidly in the air or in fresh-water, but the full-grown are more tenacious, and the old become even rigid. The *colour* when young is a very pale yellowish-olive; afterwards it grows darker, and in age is a rusty-brown. In drying it rarely (except when young) adheres to paper. I have not seen the fructification.

This curious plant is generally distributed along the shores of most of the warmer seas, growing in rather shallow water, on rocks or beds of coral, and often forming widely extended groups of fronds. It assumes several forms; being sometimes very lace-like and delicate, of a pale colour, and very flaccid substance; and sometimes coarse in substance, less open, and not adhering to paper. In Ner. Bor. Amer., I have figured the young plant, such as it occurs on the coasts of Florida; and our present figure represents the mature frond, as seen in the best-grown Australian individuals. Other specimens from the Friendly Islands are much more slender and more full of small holes; but I have found it impossible, with numerous individuals before me, from many distant parts of the world, to fix limits to the varieties, much less to establish different species among them.

A beautiful figure will be found in the great French work on Egypt.

Fig. 1. A full-grown frond of HYDROCLATHRUS CANCELLATUS,—*the natural size.*

Plate LXI



Vincent Brooks Imp

Plate XCIX.

ACROTYLUS AUSTRALIS, *J. Ag.*

Gen. Char. *Frond* compressed, linear, dichotomous, composed of three strata of cells; the *medullary* of branching, reticulately anastomosing, slender filaments; the *intermediate* of roundish-angular cells; the *cortical* of vertically seriated, coloured cellules. *Fructification:* 1, *conceptacles* semi-immersed in the frond, opening by a terminal pore, containing numerous parietal tufts of moniliform spore-threads; 2, *zonate* tetraspores, in spot-like, defined *sori*, under the apices of the segments.—Acrotylus (*J. Ag.*), from ακρος, *topmost*, and τυλος, *a tumour* or *callus;* alluding to the apical sori.

Frons compressa, linearis, dichotoma, stratis fere tribus contexta; strato medullari ex filis elongatis ramosis intertextis anastomosantibusque, intermedio cellulis rotundato-angulatis, corticali cellulis minutis in fila moniliformia verticalia subramosa ordinatis formato. Fruct.: 1, *desmiocarpia frondi semi-immersa, carpostomio demum aperta, fasciculos parietales plures filorum sporiferorum foventia;* 2, *tetrasporæ zonatim divisæ, in soros definitos infra apices segmentorum evolutos nidulantes.*

Acrotylus *australis*, J. Ag.

Acrotylus australis, *J. Ag. Act. Holm. Oefvers.* 1849, *p.* 87. *Harv. Alg. Austr. Exsic. n.* 330. *Harv. in Hook. Fl. Tasm. v.* 2. *p.* 317.

Hab. At Sydney, New South Wales, *Baron Gyllenstierna, fide J. Ag.* Mouth of the Glenelg River, South Australia, *Dr. Curdie.* Abundant at Port Fairy, *W. H. H.;* also at Western Port, Victoria, *W. H. H.* Tasmania, *C. Stuart.*

Geogr. Distr. Southern and eastern shores of Australia. Tasmania.

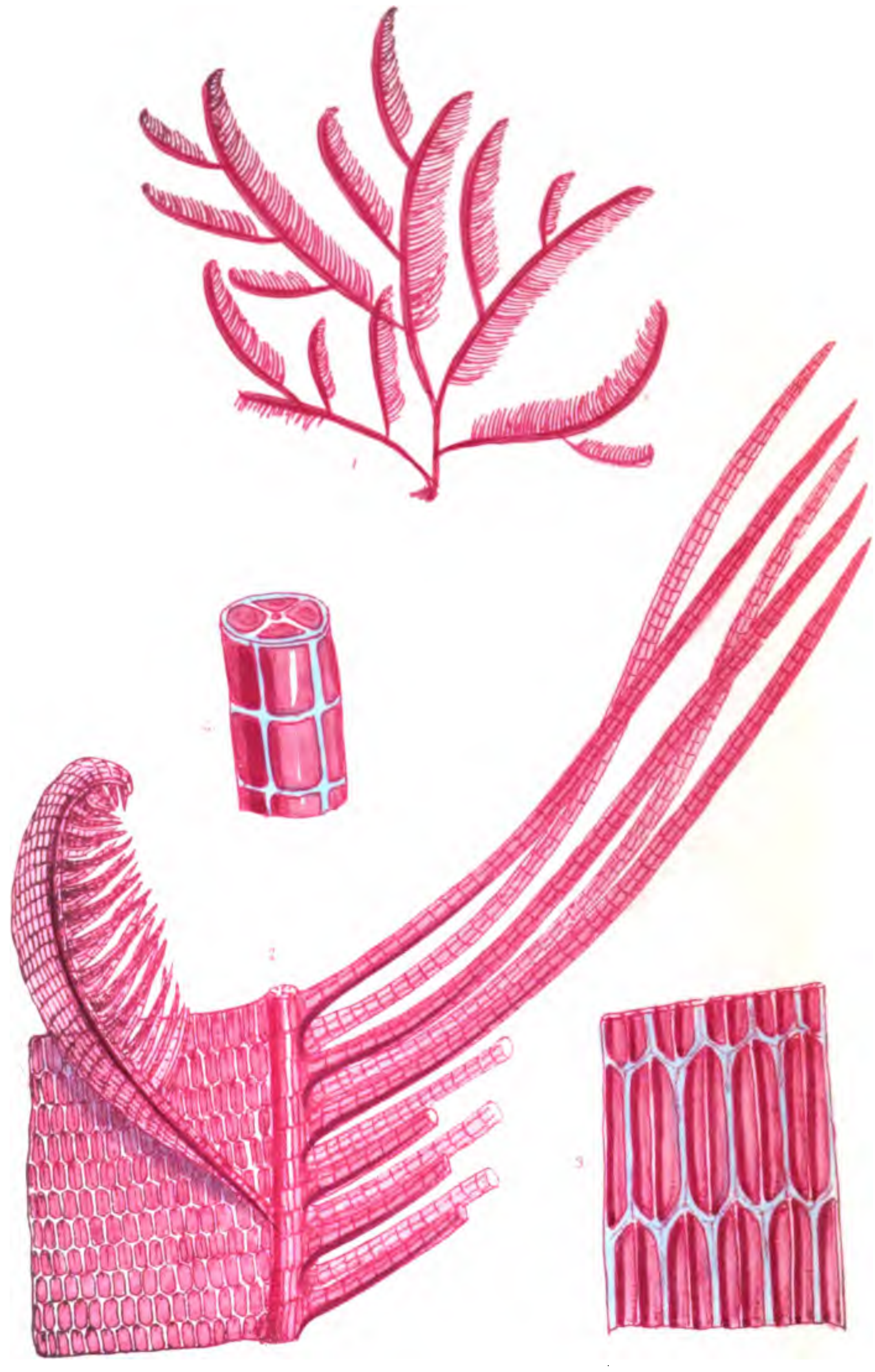
Descr. *Root* discoid. *Fronds* tufted, 3–6–8 inches long, and as much in the expansion of the branches, compressed, everywhere preserving a nearly uniform breadth of 1–1½ lines, either stipitate or branched from the base, many times dichotomous, with wide, rounded axils, fastigiate; the apices either rounded or obsoletely bidentate or emarginate. The forking is tolerably regular. The *margin* of the segments is either simple or furnished with lateral, proliferous, simple or forked lobules, from ¼–1 inch long, spreading horizontally. All the ramification is strictly distichous. The *conceptacles* are scattered along the branches; they are slightly raised towards one side, depressed in the centre, and finally pierced in the depressions; the cavity is spheroidal, and the walls are densely set with tufts of branching, moniliform spore-threads, which are afterwards resolved into spores. *Tetraspores* are borne in oval or subrotund, defined, slightly raised and wart-like *sori* (scarcely so prominent as to be called *nemathecia*), and are 3–4 times larger than broad, and zonate. The *colour* is a dark brownish-red, becoming much darker and even blackish in drying. The *substance* is tough, leathery when dry, and the plant does not adhere to paper in drying.

If I am correct in referring the plant here figured to the *Acrotylus australis*, J. Ag., of which I have seen no authentic specimens, and the cystocarpic fruit of which was not known to Prof. Agardh when he founded his genus *Acrotylus*, then the genus must be placed in *Gelidiaceæ* (tribe *Chætangieæ*), instead of among the *Cryptonemiaceæ*, where Agardh puts it; and also, the two species of the subgenus *Prismatoma* must be separated. This separation will reduce *Acrotylus* to the single species now described; and this has so much of the external aspect of a *Chætangium*, of the section *Nothogenia*, that the propriety of keeping it separate may be questioned. The characters by which *Acrotylus* differs from *Chætangium* are found in the more or less developed "*intermediate stratum*" of roundish angular cells (*gonidia*), and in the tetrasporic sori of the present genus. In *Chætangium* the tetraspores are dispersed, and the frond composed wholly of filaments.

My first specimens of *Acrotylus australis* were given me by Dr. Curdie, of Geelong, and not then recognizing them as the plant previously described by Agardh, I named them "*Curdiea*" in his collection. I have since selected another *Curdiea* (Plate XXXIX.) which I hope may prove a more permanent memento.

Fig. 1. ACROTYLUS AUSTRALIS,—*the natural size.* 2. Portion of a branch, with *conceptacles*,—slightly *magnified*. 3. Section through the frond and a conceptacle. 4. Section through a *sorus*; and 5, a *tetraspore*:—variously *magnified*.

Plate I



Vincent Brooks Imp.

PLATE C.

CLIFTONIA PECTINATA, *Harv.*

GEN. CHAR. *Frond* stipitate, formed of secundly proliferous, halved, pectinate phyllodia. *Phyllodia* costate, with diverse sides; one side flat, areolate, membranous, very entire; the other pectinato-partite, the laciniæ articulated, polysiphonous. *Fructification* unknown.—CLIFTONIA (*Harv.**), in honour of George Clifton, Esq., R. N., the indefatigable and successful explorer of the Algæ of Western Australia.

Frons stipitata, ex phyllodiis secunde proliferis hemiphyllis hinc pectinatis evoluta. Phyllodia costata, lateribus diversis; uno latere plano areolato membranaceo integerrimo, altero pectinato-partito, laciniis articulatis pleiosiphoniis. Fructus ignotus.

CLIFTONIA *pectinata;* phyllodia pectinate, their laciniæ filiform-subulate, acute, many times longer than the breadth of the narrow-linear lamina.

C. pectinata; *phyllodiis pectinatis, laciniis filiformi-subulatis acutis laminæ angustissimæ latitudine multoties longioribus.*

HAB. At Garden Island, Western Australia, August, 1858, very rare, *G. Clifton, Esq.*

GEOGR. DISTR. Western Australia.

DESCR. *Root* discoid. *Stem* coriaceo-cartilaginous, terete, rigid, one or two inches long, branched, the branches ending in phyllodia. *Phyllodia* 2–3 inches long, comb-shaped, having a cylindrical, densely cellular, opaque costa, falcate, incurved; the external or convex side of the costa winged with a very narrow, linear lamina, scarcely more than ¼ line in width, composed of oblong, hexagonal cellules, set in horizontal rows; all of equal length, and 2–3 times as long as broad; the internal or concave side closely pectinated with a *double* row of slender, subulate ramelli. These *ramelli* are four-tubed (of the structure of a *Polysiphonia*), articulated, the articulations as long as broad; they are nearly ¼ inch long, and of the thickness of horse-hair. Young phyllodia are given off proliferously from the costa of the older, and are always directed toward the side on which the lamina is developed. The *colour* is a deep crimson-lake. The *substance* is membranous, and not very soft, and in drying the plant adheres but imperfectly to paper. No fructification has, as yet, been observed.

* * *

In the remarks under *Encyothalia,* in our January number, I alluded to another new genus sent to me by Mr. Clifton; and though the specimens yet received are so far imperfect that they are not in fruit, I do not wish to delay the publication of so beautiful and remarkable a type of structure; and the more especially because it is, I trust, destined to bear the name of its energetic and obliging discoverer, to whose zeal and liberality I am indebted for several of the most curious Algæ already figured in this work, and for others which will appear in future numbers.

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* *Cliftonia,* Banks, is the same as the earlier and now generally adopted *Mylocarium,* Willd.

Cliftonia, as now proposed, will include, besides our *C. pectinata*, the old "*Amansia semipinnata*" of Lamouroux, which may be called *Cliftonia Lamourouxii*. It differs from our present plant in the proportions between the breadth of the lamina bordering the outer edge of the costa, and the pectinations which issue from the opposite edge. It is of extreme rarity: and as yet I have only seen a fragment, sent by Lamouroux to the late Mr. Dawson Turner, and now preserved in the 'Hookerian Herbarium.' This fragment well agrees with the figure given by Lamouroux, through which it is chiefly known to botanists.

Cliftonia may be regarded as holding a middle station between *Amansia* and *Claudea;* agreeing with the former in the cellular structure, and with the latter in the evolution of the frond. The fructification, it may be anticipated, will probably afford some strengthening characters further to mark the genus. If one may hazard a conjecture, I should guess that the *ceramidia*, as in *Claudea*, will be formed from contracted phyllodia; and the *tetraspores* lodged in a single row, in the ramelli. I trust Mr. Clifton's future explorations of Garden Island may satisfactorily solve this problem.

Fig. 1. CLIFTONIA PECTINATA,—*the natural size.* 2. Fragment of a phyllodium, with a young one starting from its midrib. 3. Some of the cellular tissue from the lamina. 4. Frustule of one of the pectinate ramelli:—*the latter figures variously magnified.*

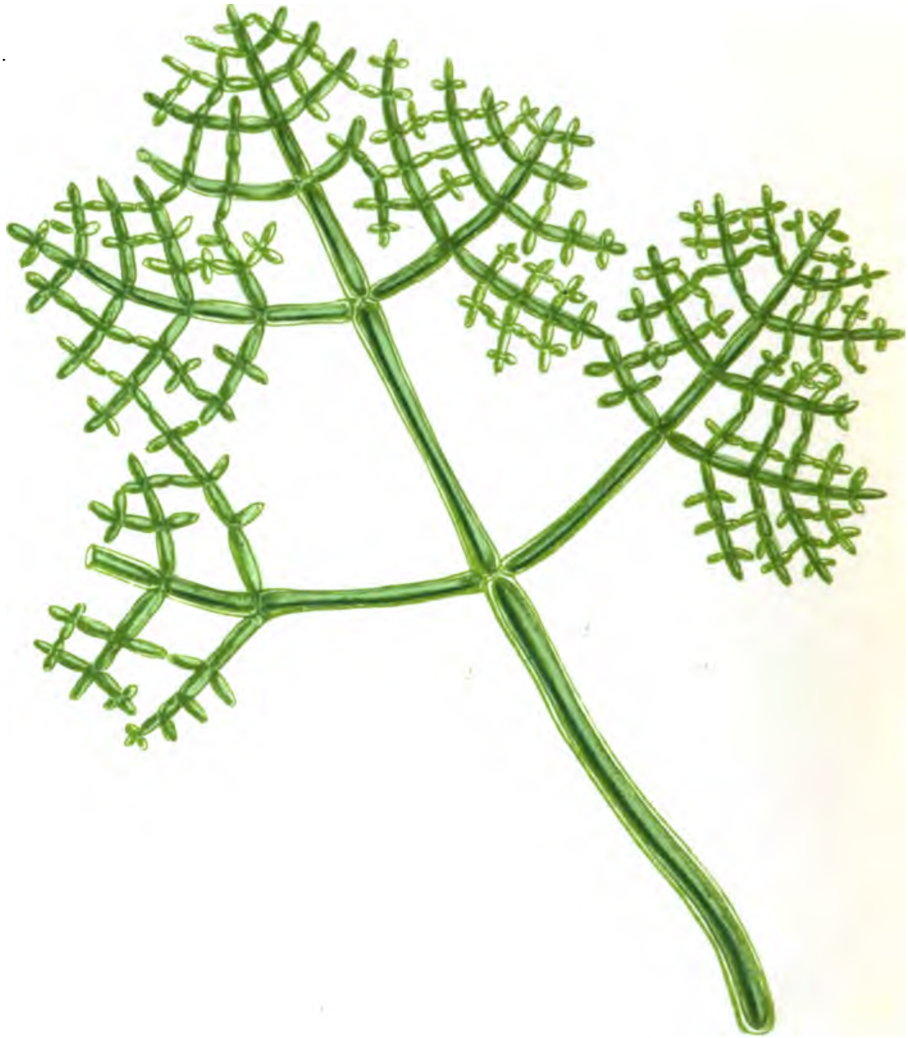


PLATE CI.

CLADOPHORA? ANASTOMOSANS, *Harv.*

GEN. CHAR. *Filaments* tufted, articulated, uniform, branched. *Articulations* filled with green, granular endochrome, which is changed at maturity into zoospores.—CLADOPHORA (*Kütz.*), from *κλαδος*, *a branch*, and *φορεω*, *to bear.*

Fila cæspitosa, articulata, ramosa. Articuli endochromate viridi grumoso, demum in zoosporos mutato, repleti.

CLADOPHORA? *anastomosans;* bright-green, rather rigid, rising from matted, irregularly branched filaments; upright filaments (fronds) stipitate, uncial or biuncial, distichously bi-tripinnate; pinnæ and pinnules opposite, horizontally patent, the ultimate pinnules here and there anastomosing; articulations of the rachis and primary pinnæ cylindrical, many times longer than broad, of the ramuli 2–3 times as long as broad, constricted at the nodes.

C.? anastomosans; *lætevirens, rigidiuscula, ex filis intricatis vage ramosis radicalibus enata; filis erectis (v. frondibus) stipitatis uncialibus v. biuncialibus distiche pluries pinnatis; pinnis pinnulisque oppositis horizontaliter patentibus, ultimis hic illic anastomosantibus; articulis ramorum majorum cylindricis longissimis, ramulorum diametro 2–3-plo longioribus ad genicula constrictis.*

C. ANASTOMOSANS, *Harv. in Trans. R. I. Acad. v.* 22. *p.* 565; *Alg. Austr. Exsic. n.* 582.

HAB. Cast ashore at Fremantle, rare, *W. H. H.*

GEOGR. DISTR. Western Australia.

DESCR. Originating in a mat of intricately tangled, irregularly branched, decumbent, confervoid filaments. *Fronds* or upright filaments tufted, 1–2 inches long, the basal articulations or stipes $\frac{1}{2}$–$\frac{3}{4}$ inch long, regularly pinnated in several series, the whole having an ovate or ovate-oblong outline. The pinnæ and pinnulæ are perfectly distichous, and spread nearly at right-angles from their respective rachides; the *pinnæ* are subdistant, the *pinnulæ* closely set. All the divisions are strictly opposite, except by the occasional suppression or malformation of a ramulus. The *ramuli* more or less anastomose at their tips, and thus the older frond assumes partially the character of a *Microdictyon*. The basal articulations of each pinna, and the lower ones of the main rachis, are of great length; the upper become gradually shorter, and those of the pinnules are quite short. The *colour* is a vivid yellowish-green. The *substance* when recent is rigid, and the frond does not closely adhere to paper in drying.

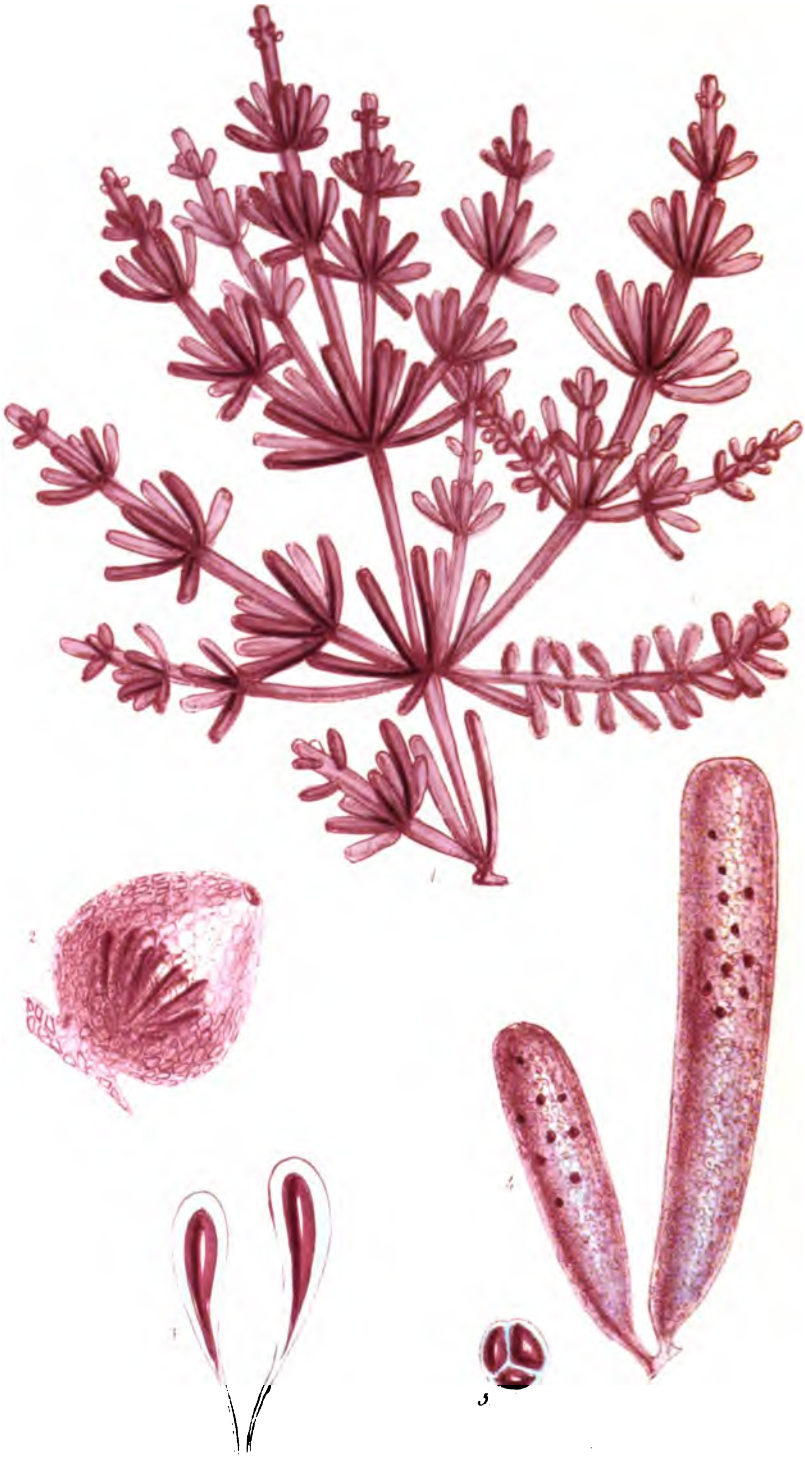
* * *

I have had some hesitation in referring the curious species here figured to *Cladophora*, on account of the decided tendency to anastomosis among the ramuli, a tendency that increases with the age of the plant, and in full-grown specimens (if ours be, as I suspect, immature) would probably be more strongly indicated. The anastomosing ramuli show an affinity with *Microdictyon*, and consequently with the *Valoniaceæ;* but the character is not so decided as in *Microdictyon*, and the nature and ramification of the filaments are very similar in this plant to what they are in *Cladophora composita*, and several other undoubted species of that genus. On the whole, therefore, I prefer leaving *C. anastomosans* in *Cladophora* until some better place be found for it.

It is a deep-water plant, and as yet very rare. The only specimens seen were picked up after a gale, on the shore, near Swan River. It has not yet been sent by Mr. Clifton; another proof of its rarity.

Fig. 1. CLADOPHORA ANOSTOMOSANS,—*the natural size.* 2. A young frond,—*magnified.*

Plate CI



Vincent Brooks Imp.

Plate CII.

CHONDRIA VERTICILLATA, *Harv.*

Gen. Char. *Frond* filiform, cartilaginous, dendroid, opaque, coated with small, polygonal, irregularly placed cells. *Axis* articulated, polysiphonous. *Ramuli* clavæform, much constricted at their insertion. *Fructification:* 1, ovate *ceramidia;* 2, tripartite *tetraspores,* formed irregularly, in the clavate ramuli.—Chondria (*Ag.*), χονδρος, *cartilage.*

Frons filiformis, cartilaginea, dendroidea, opaca, cellulis irregularibus polygonis corticata. Axis articulatus, polysiphonus. Ramuli clavati, basi constricti. Fruct.: 1, *ceramidia ovata;* 2, *tetrasporæ triangule divisæ, in ramulis immersæ, sparsæ v. irregulariter aggregatæ.*

Chondria *verticillata;* dark brownish-purple; frond succulent, terete, twice or thrice umbellately decompound; the branches virgate, whorled at short intervals with linear-oblong, very obtuse, fasciculate, juicy ramuli; conceptacles ovate, sessile; the tetraspores scattered.

Ch. verticillata; *badia v. fusco-purpurea; fronde tereti succosa bis terve umbellatim composita; ramis virgatis; ramulis creberrimis fasciculato-verticillatis lineari-oblongis obtusis succo repletis basi maxime constrictis; ceramidiis ovatis sessilibus; tetrasporis sparsis.*

Chondria verticillata, *Harv. in Trans. R. I. Acad. v.* 22. *p.* 539; *Alg. Austr. Exsic. n.* 162.

Hab. Rottnest Island, *W. H. H.* Garden Island, *G. Clifton.* George-town, Tasmania, *Rev. I. Fereday.* Port Fairy, Victoria, *W. H. H.*

Geogr. Distr. Western and southern coasts of Australia. Tasmania.

Descr. *Root* small, discoid. *Stems* densely tufted, 3–5 inches long, nearly a line in diameter, simple or umbellately compounded, each partial umbel of 4–5 or more rays, round whose bases a whorl of fascicled ramuli are frequently developed. The secondary branches, or rays of the umbel, are long and virgate, simple, or umbellately compounded, and are either whorled at short intervals with simple, club-shaped or linear-oblong ramuli, or are closely beset throughout with such ramuli. In the latter case the whorls are very irregular, or the ramuli are emitted from all sides without obvious order. *Ramuli* ¼–½ inch long, nearly 1 line in diameter, strongly constricted at base, very obtuse, patent. *Ceramidia* ovate, sessile on the ramuli. *Tetraspores* either scattered or brought together in an irregular sorus near the middle of the ramulus. *Colour* a dull purplish-brown, becoming darker in drying; rarely a more vivid purple. *Substance* succulent

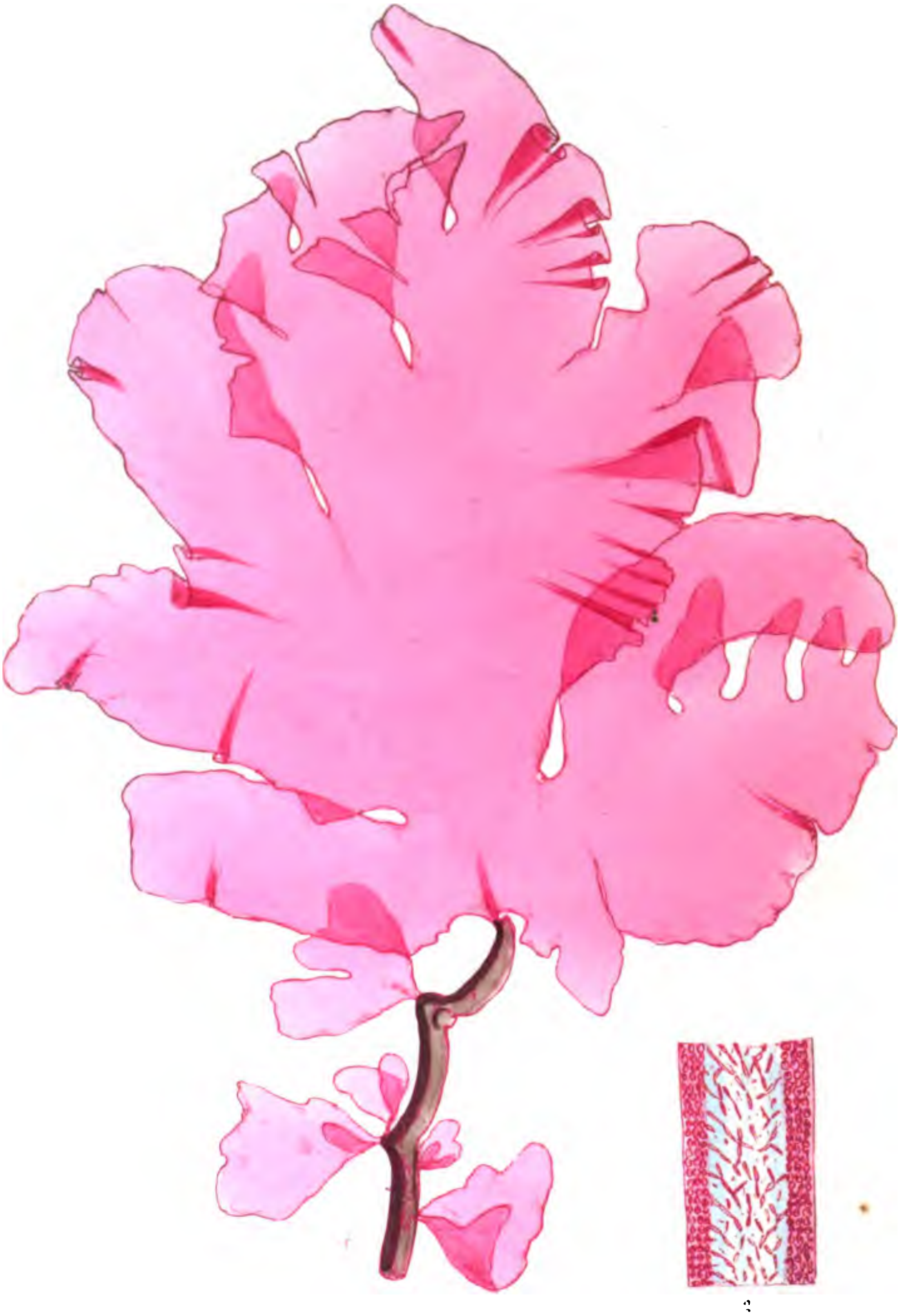
tenacious, not soon decomposing, becoming soft on exposure. The plant adheres very firmly to paper in drying, and when dry has a glossy surface.

The genus *Chondria*, as revised by Prof. J. Agardh (see Harv. Ner. Bor. Amer. part 2. p. 19), now includes a considerable number of species, several of which are natives of Australia, including the type of the genus, *Ch. dasyphylla* (*Fucus dasyphyllus*, Turn.). It was formerly included in *Laurencia*, to which, externally, the *Chondriæ* have considerable resemblance, but the structure of the axis is decidedly different, and there are other differences which warrant the removal of *Chondria* to the *Rhodomelaceæ*.

Our *Chondria verticillata*, though allied to several, is well characterized by its partly umbellate, partly whorled ramification, the softness and yet tenacity of its substance, and the dull or dark colour. It is perhaps nearest to *C. umbellula*, but is a very much larger, more robust, and more branching plant. It is less brightly coloured than *C. clavata*, differently branched, and of softer substance, and does not shed its ramuli in freshwater. Though found in several distant localities, it appears to be among the rarer kinds.

Fig. 1. CHONDRIA VERTICILLATA,—*the natural size.* 2. A ceramidium. 3. Spores from the same. 4. Two ramuli, with tetraspores. 5. A tetraspore:—the latter figures *magnified.*

Plate CCI



Vincent Brooks Imp.

Ser. RHODOSPERMEÆ. Fam. *Cryptonemiaceæ.*

PLATE CIII.

HALYMENIA? CLIFTONI, *Harv.*

GEN. CHAR. *Frond* terete, compressed or flat, gelatinoso-membranaceous, dichotomous or pinnatifid, composed of two strata; the *medullary* stratum formed of a few, laxly interlaced, branching filaments, lying in gelatine; the *cortical* membranous, formed of minute, coloured cellules. *Fructification:* 1, *favellæ* immersed in the frond, suspended under the peripheric stratum; 2, cruciate *tetraspores,* scattered through the surface-cellules.—HALYMENIA (*Ag.*), from ἁλς, *the sea,* and ὑμην, *a membrane.*

Frons teres, compressa v. plana, gelatinoso-membranacea, dichotoma v. vage pinnatifida, stratis duobus composita; strato medullari ex filis paucis laxe intricatis ramosis succo gelatinoso immersis, peripherico membranaceo cellulis minutis coloratis formato. Fruct.: 1, *favellæ frondi immersæ, infra stratum periphericum suspensæ;* 2, *tetrasporæ sparsæ, cruciatim divisæ.*

HALYMENIA *Cliftoni;* frond flat, delicately gelatinoso-membranaceous, rose-red, expanded and leaf-like, of no definite shape, variously lobed and sinuate; the margin undulate; segments subacute; favellæ dispersed.

H. Cliftoni; *fronde plana tenuiter gelatinoso-membranacea rosea latissima foliacea varie lobata et sinuata; margine undulato nunc minute glandulifero; favellis per totam frondem sparsis.*

HALYMENIA Kallymenioides, *Harv. in Trans. R. I. Acad. v.* 22. *p.* 556. *n.* 257.

HAB. Cast ashore at Fremantle, rare, *W. H. H.* Garden Island, *G. Clifton.*

GEOGR. DISTR. Western Australia.

DESCR. *Root* a small disc. *Frond* sessile, cuneate at base, quickly expanding into a leaf-like lamina, 6–8 inches in length, and 4–5 in breadth. This *lamina* is of no definite shape; sometimes it is nearly or quite simple, sometimes cut round the edges into numerous shallow lobes, and sometimes deeply parted into many oblong segments. The *margin* is either flattish or undulated, and either quite entire or minutely set with glandular projections; these are scarcely visible without a lens. The *favellæ* are minute, dispersed over the whole surface, and very numerous on the fertile frond. The peripheric stratum differs in thickness in different individuals, being sometimes composed of one or two, sometimes of three or four rows of cellules; a corresponding variation occurs in the medullary filaments. The *colour* is a delicate but brilliant rose-red, fading to yellowish or greenish. The *substance* is very soft and thin; and in drying the plant adheres very firmly to paper.

Since the publication of the memoir on Western Australian Algæ, quoted above, I have received much more perfect specimens of this beautiful species from my often-mentioned corr spondent, Mr. Clifton, and I am therefore induced to alter the trivial name formerly given, and which was suggested by the imperfect specimens first seen.

The habit and substance of the frond are those of the membranous *Halymeniæ;* and the fructification (unfortunately omitted in our Plate) is not dissimilar. But the cellular structure of the membrane is a little different from its typical condition in *Halymenia,* not sufficiently so however to warrant a removal from that natural and somewhat diversified group of Algæ.

Halymenia Floresia, of very large size, has been found by Mr. Clifton near Fremantle. The specimens collected there by me were poor and few. Those sent by Mr. Clifton are among the most luxuriant examples I have seen of this widely distributed and beautiful plant.

Fig. 1. HALYMENIA CLIFTONI,—*the natural size.* 2. Thin slice, to show internal structure,—*magnified.*

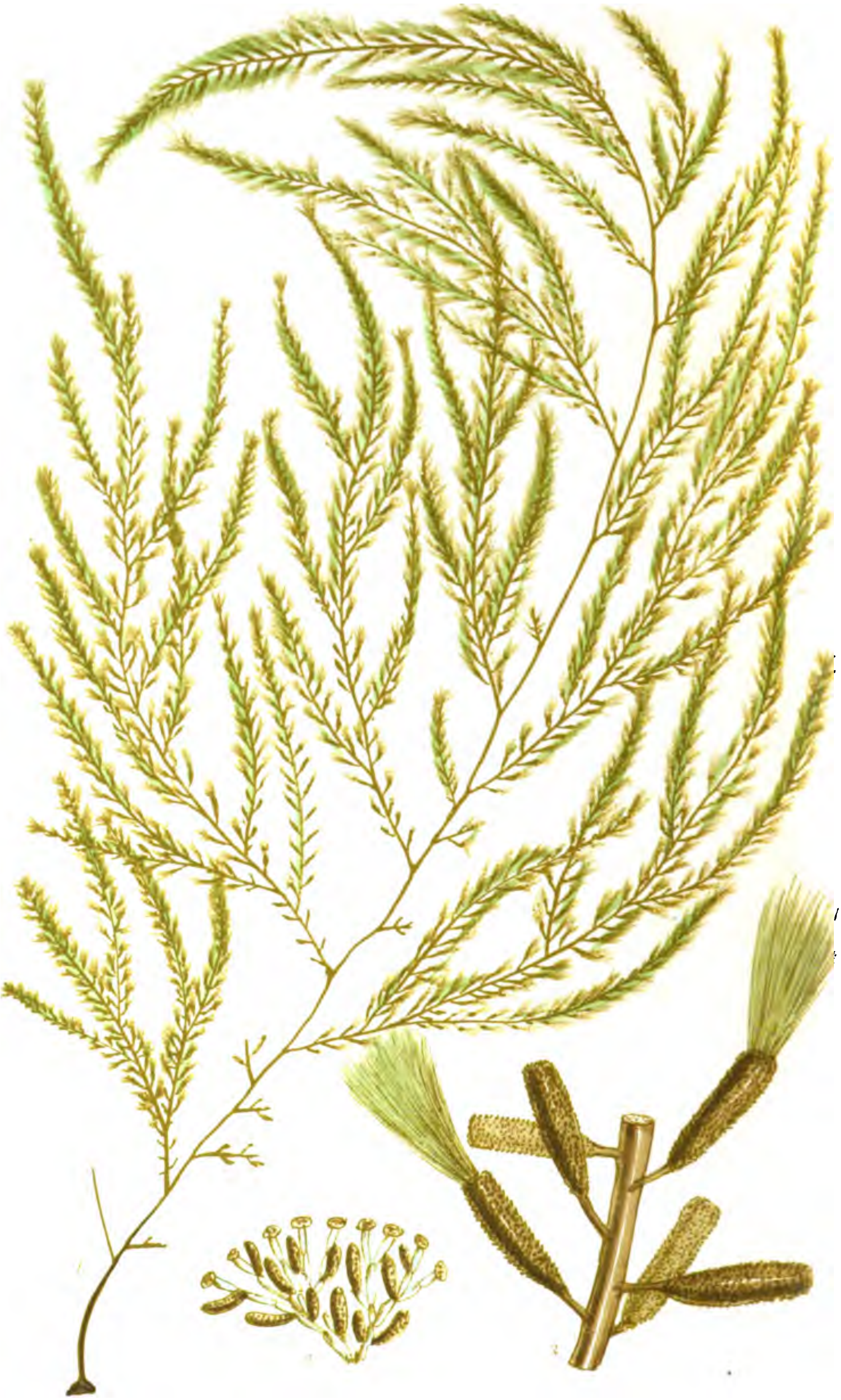


Plate CIV.

SPOROCHNUS COMOSUS, *Ag.*

Gen. Char. *Frond* filiform, solid, pinnately decompound. *Receptacles* pod-shaped, pedicellate (rarely sessile), crowned with a tuft of soft hairs, and densely covered with whorled, branching, sporiferous filaments. *Spores* obovoid, attached to the sides of the filaments.—Sporochnus (*Ag.*), from *σπορος, a seed,* and *χνοος, wool,* because tufts of soft hairs crown the fructification.

Frons filiformis, solida, pinnatim ramosa. Receptacula siliquæformia, pedicellata (rarissime sessilia), apice comosa, paranematibus ramosis horizontalibus verticillatis densissime vestita. Sporæ obovoideæ, ad paranemata laterales.

Sporochnus *comosus;* frond robust or slender, repeatedly decompound, the branches and their divisions filiform, erecto-patent; receptacles clavato-cylindrical, twice as long as the pedicels.

S. comosus; *fronde crassiuscula v. tenui repetite decomposita; ramis primariis secundariisque filiformibus erecto-patentibus; receptaculis clavato-cylindraceis pedicello brevi subduplo triplove longioribus.*

Sporochnus comosus, *Ag. Syst. Alg. p.* 259. *J. Ag. Sp. Alg. v.* 1. *p.* 174. *Kütz. Sp. Alg. p.* 569. *Harv. Alg. Exsic. Austr. n.* 50; *Trans. R. I. Acad. v.* 22. *p.* 534; *Fl. Tasm. v.* 2. *p.* 287.

Hab. New Holland, *Mus. Paris., fide Agardh.* Fremantle and King George's Sound, West Australia. At Port Phillip Heads, Victoria; and at Georgetown, Tasmania, abundantly, *W. H. H., etc.*

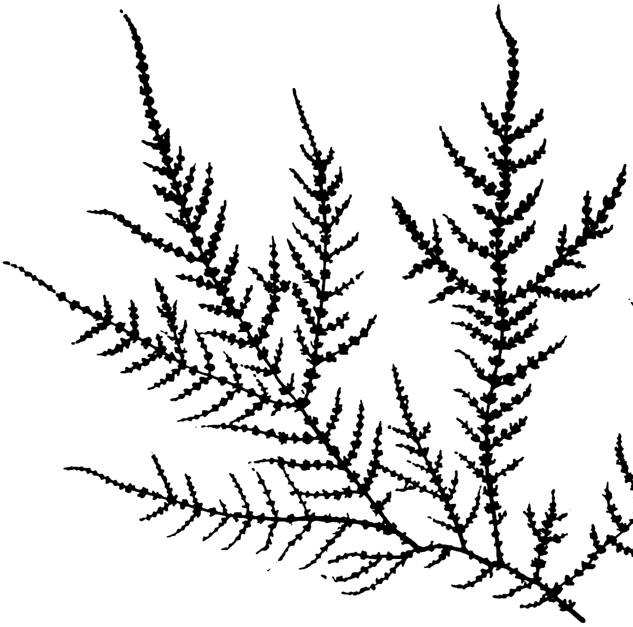
Geogr. Distr. West and south coasts of Australia. Tasmania.

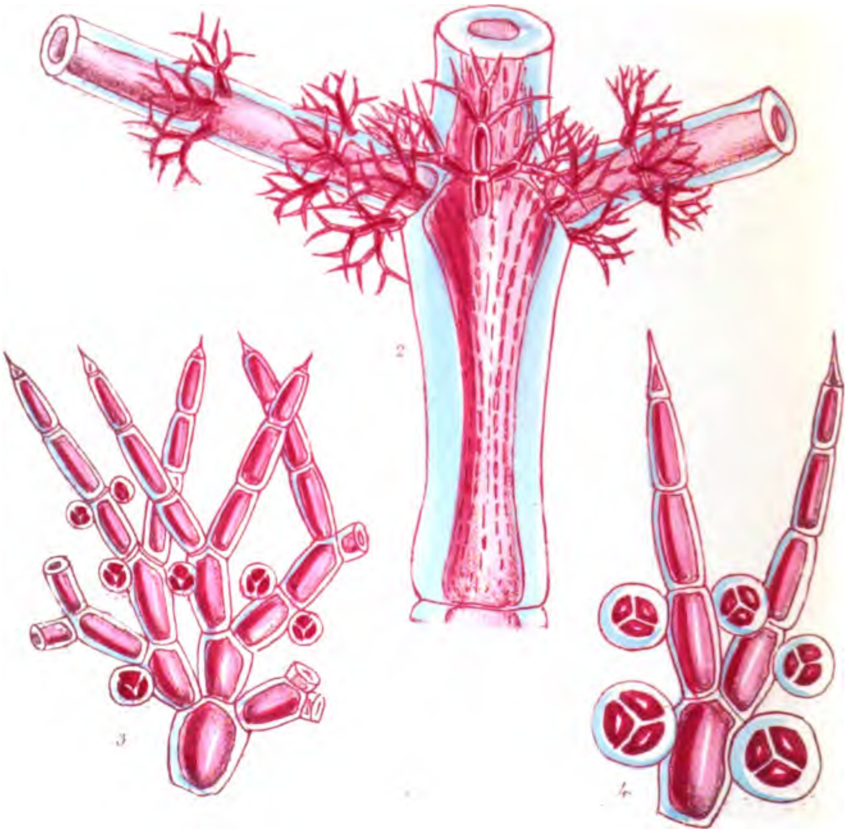
Descr. *Root* an expanded disc, covered with woolly hairs. *Frond* one to three feet long or more, as thick as packthread at base, attenuated upwards, setaceous near the extremity; the lesser branches and ramuli almost capillary. *Stem* sub-simple, densely set with long, lateral branches, which are long and simple, but furnished, especially in their upper half, with secondary, similar, but smaller branches. In large specimens the subdivision is carried to a greater extent. In all cases the branches taper much toward the extremity, and are terminated by a small tuft of soft hairs, about two lines in diameter. *Receptacles* thickly set along the branches, spreading toward all sides, cylindrical or slightly clavate, very obtuse, scarcely tapering at base, or abrupt; twice or thrice as long as the pedicel, or 1-1½ times, or 5-6 times as long; varying greatly in different specimens. *Colour* when growing olivaceous, changing to greenish in the air and in fresh-water. *Substance* rather rigid in the stem; softer in the branches. The frond adheres pretty closely to paper in drying.

I here figure the commonest and therefore the most characteristic of the Australian species of *Sporochnus*, and also the most variable. When growing in shallow water, as I have seen it in King George's Sound, the substance is more rigid, the diameter of stem and branches greater, and the ramification very dense and stunted. In close proximity, but in deeper water, the frond is slender, soft, and flaccid, and the branches drawn out into long threads, two feet or more in length, and very sparingly ramulose. Again, in the Tamar, Tasmania, the frond attains still larger dimensions, and the branches are more attenuated. Among hundreds of specimens examined, there is a complete gradation in these respects. The form of the receptacle and its proportion to the pedicel are also very variable in this species. Our figure represents the average proportions and shape; but in some of the attenuated, deep-water specimens, the length of receptacle is doubled; in others it varies on the same frond.

Search should be made by Tasmanian collectors for the *Sp. Herculeus*, J. Ag., formerly found by Mr. Gunn, at Georgetown, and known by the very great length of its receptacles,—"*six or eight lines, or nearly an inch long, nearly entirely cylindrical, and as thick as sparrow's-quill.*" (See J. Ag. Sp. Alg. v. 1. p. 175.)

Fig. 1. SPOROCHNUS COMOSUS,—*the natural size.* 2. Fragment, with the receptacles, *in situ*,—*magnified.* 3. Some of the sporiferous filaments of the receptacle,—*highly magnified.*





Vincent Brooks Imp.

Plate CV.

WRANGELIA NITELLA, *Harv.*

Gen. Char. *Frond* filiform, decompound, articulated, one-tubed; the *internodes* naked or coated with minute cellules; the *nodes* clothed with opposite or whorled articulated ramelli. *Fructification:* 1, *cystocarps* terminating short branches, involucrated by the uppermost whorled ramelli, and consisting of tufts of pear-shaped pedicellate *spores* and slender *paranemata*; 2, naked, triangularly parted *tetraspores*, borne on the sides of the whorled ramelli.—Wrangelia (*Ag.*), in honour of Baron Wrangel, a Swedish naturalist.

Frons filiformis, decomposita, articulata, monosiphonia, nuda v. cellulis corticata, verticillis ramellorum ad genicula onusta. Fruct.: 1, *cystocarpia ramos terminantia, ramellis supremis involucrata, fasciculis numerosis sporarum pyriformium pedicellatarum et paranematibus tenuibus constantia;* 2, *tetrasporæ nudæ, triangule divisæ, ad ramellos sessiles.*

Wrangelia *nitella;* frond membranaceous, flaccid, pellucidly jointed throughout (the joints 4–6 times as long as broad), decompound-pinnate; branches and branchlets mostly opposite, distichous, with whorled ramelli at the nodes; ramelli di-trichotomously multifid, the divisions patent, very acute; tetraspores globose, sessile on the ramelli.

W. nitella; *fronde membranacea flaccida e basi articulata (articulis diametro 4–6-plo longioribus) ecorticata decomposite pinnata; ramis ramulisque sæpius oppositis distichis ad genicula verticillatim ramellosis; ramellis di-trichotome multifidis, divisuris patentibus acutissimis; tetrasporis globosis ad ramellos sessilibus; cystocarpiis ignotis.*

Wrangelia nitella, *Harv. in Trans. R. I. Acad. v.* 22. *p.* 546; *Harv. Alg. Austr. Exsic. n.* 258.

Hab. Rottnest Island, *W. H. H.* Garden Island, *G. Clifton.*

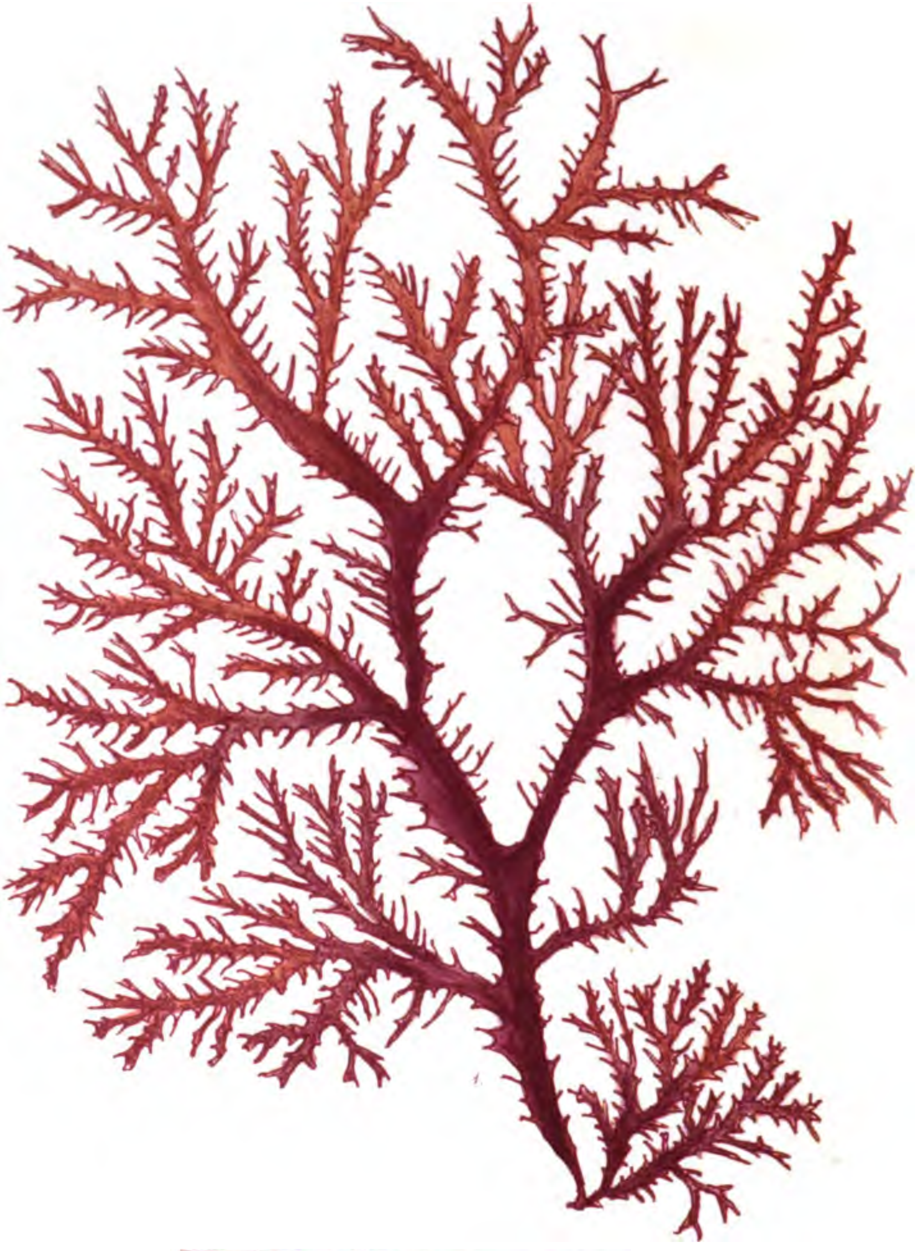
Geogr. Distr. Western Australia.

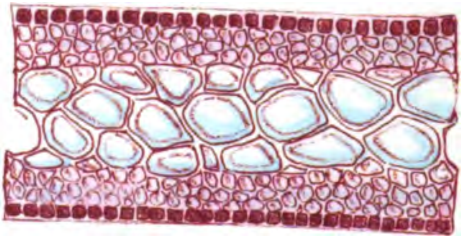
Descr. *Root* fibrous, creeping. *Fronds* 2–4 inches long, capillary or subsetaceous, pinnately or bipinnately compounded, articulated throughout, with pellucid dissepiments and internodes. *Pinnæ* and *pinnules* opposite, or by abortion alternate, frequently alternately unequal, subhorizontally patent, long and short intermixed: these articulations 4–6 times as long as broad, or longer. At each node is a whorl of minute, very much branched ramelli, ¼–½ line long, dichotomous, with wide axils; their articulations one and a half to twice as long as broad, the terminal cell sharply subulate. *Tetraspores* spherical, frequently opposite, sessile on the sides of the ramelli. *Colour* a clear, deep crimson-lake, well preserved in drying. *Substance* membranaceous, but soon softening in fresh-water. The plant closely adheres to paper in drying.

A pretty little species of *Wrangelia*, with the aspect of a small specimen of the European *W. multifida*, but differing from that species in several essential characters: particularly in the sharp-pointed or mucronate ramuli. By this latter character it agrees with *W. myriophylloides*, and *W. mucronata*, but differs by several others; nor is it likely to be confounded with any other Australian species. *W. crassa* and its allies, which externally somewhat resemble it, have very obtuse ramelli.

Fig. 1. WRANGELIA NITELLA,—*the natural size.* 2. Frustule of a branch, showing the main articulations and their whorled ramelli. 3. Part of a fertile ramellus. 4. Parts of same:—the latter figures variously *magnified.*

Plate CVI





2.

Vincent Brooks Imp.

Plate CVI.

CALLIBLEPHARIS PREISSIANA, *Ag.*

Gen. Char. *Frond* flat, cartilagineo-membranaceous, dichotomo-pinnate and fimbriate, formed of two strata of cells; the *medullary* stratum of roundish-angular, large cells, in several rows; the *cortical* of minute coloured cellules. *Fructification:* 1, sessile conceptacles, containing, within a thick pericarp, on a basal placenta, a tuft of moniliform spore-threads; 2, zonate *tetraspores,* dispersed among the cortical cellules.—Calliblepharis (*Kütz.*), from *καλος, beautiful,* and *βλεφαρις,* literally *the eyelashes* (*cilia*), here meaning fringe-like marginal processes.

Frons plana, cartilagineo-membranacea, dichotomo-pinnata et margine ciliato-fimbriata, ex stratis duobus composita; strato medullari cellulis rotundato-angulatis magnis pluriseriatis, corticali cellulis minutis coloratis formato. Fruct.: 1, *cystocarpia sessilia, intra pericarpium crassum ad placentam basalem fasciculum filorum sporiferorum moniliformium foventia;* 2, *tetrasporæ sparsæ, zonatim divisæ, in cortice nidulantibus.*

Calliblepharis *Preissiana;* frond stipitate, blood-red or purplish, rigidly cartilaginous, dichotomous; segments linear, narrow, closely pinnato-fimbriate or ciliate; pinnules (cilia) setaceous, simple or pinnulate, or irregularly toothed; fruit unknown.

C. Preissiana; *fronde stipitata rubro-sanguinea v. purpurascente rigide cartilaginea dichotoma; laciniis linearibus angustis creberrime pinnato-fimbriatis ciliatisve; pinnulis (ciliis) vix ultrasetaceis simplicibus v. ramosis v. vage inciso-dentatis; coccidiis ignotis.*

Calliblepharis Preissiana, *J. Ag. Sp. Alg. v.* 2. *p.* 622. *Harv. Alg. Austr. Exsic. n.* 302.

Calliblepharis pannosa, *Harv. Trans. R. I. Acad. v.* 22. *p.* 550.

Rhodophyllis Preissiana, *Kütz. Sp. Alg. p.* 786.

Rhodymenia Preissiana, *Sond. in Lehm. Pl. Preiss. v.* 2. *p.* 191.

Hab. Swan River, *Preiss, Mylne, Clifton, etc.* King George's Sound, at Middleton Bay, *W. H. H.*

Geogr. Distr. Western Australia.

Descr. *Root* a minute disc. *Fronds* 3–10–12 inches high, and as much in the expansion of the branches, dichotomous, very much divided, cut into segments with an average width of 1–3 lines. The primary division is irregularly forking, the lower forks at wide, the upper at short intervals; the secondary segments are very irregularly laciniated, and all are bordered with setaceous, horizontal, simple or ramulose ciliary processes. The ends of the branches are of unequal length; the axils are all wide and rounded, and the whole frond has a ragged character. In some specimens the ramification is excessively dense and bushy. No fruit has yet been observed. The *colour* is either a dull red or a dull purple, darkening in the herbarium, and fading through orange and yellow to a creamy white. The *substance* is hard and rigid, and the plant does not adhere to paper in drying.

To the genus *Calliblepharis*, founded on the *Rhodymenia ciliata* of earlier authors, several exotic species have recently been added, some of them, like the present, being thus referred provisionally, because they agree in external habit, and do not materially differ in cellular structure. Until the fruit shall have been ascertained, the exact relationship of the present plant, which is common on the shores of Western Australia, cannot be determined. Its rigid substance, variable incision, and abundantly fimbriate and ragged segments, induce us to place it in *Calliblepharis*, where it may stand next *C. jubata*.

A second species, *C. conspersa*, resembling *C. ciliata* in general aspect, occurs, but much more rarely, near Fremantle.

Fig. 1. Calliblepharis Preissiana,—*the natural size.* 2. A thin slice,—*magnified.*

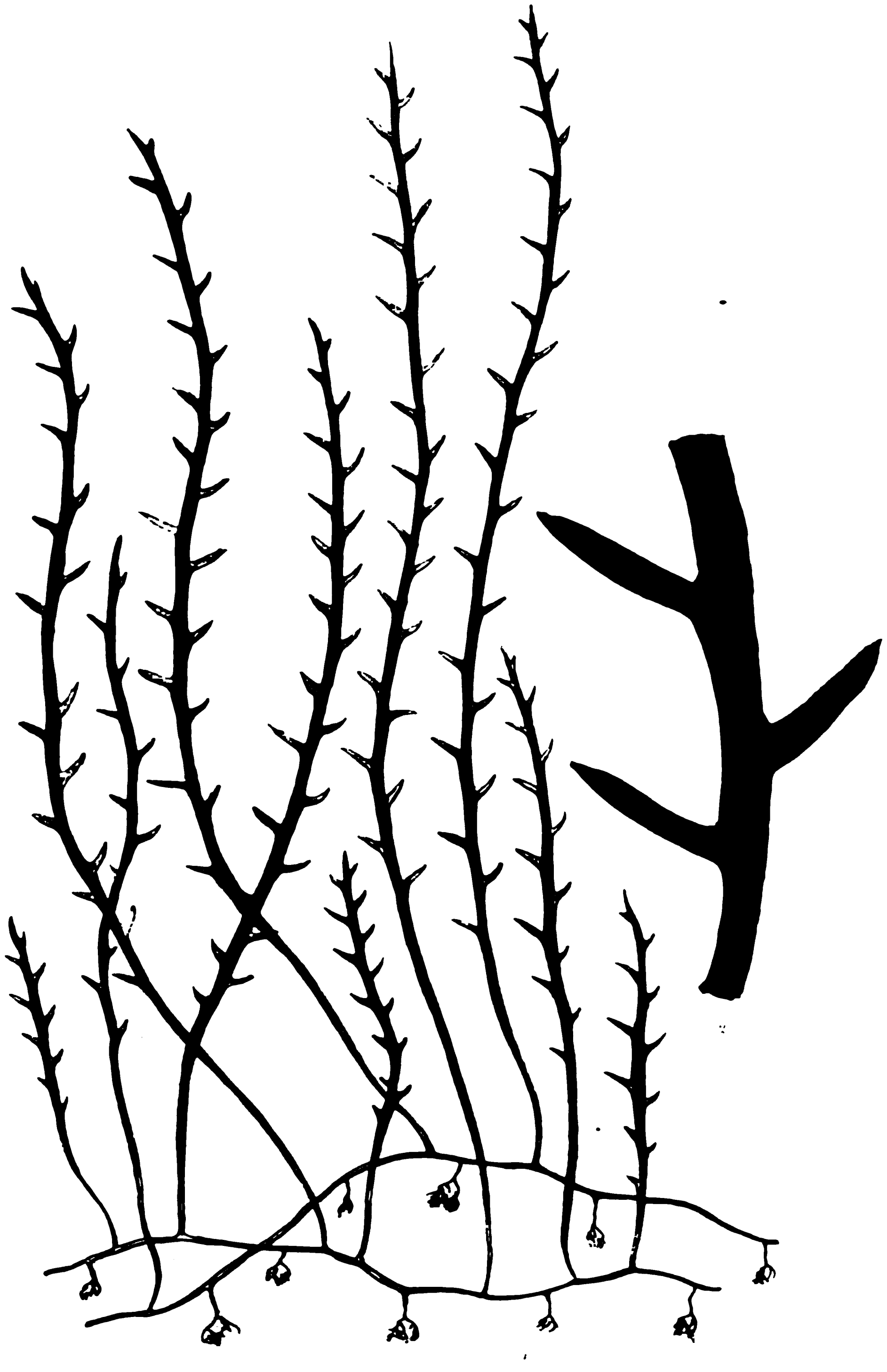


PLATE CVII.

CAULERPA REMOTIFOLIA, *Sond.*

GEN. CHAR. *Frond* consisting of prostrate surculi, rooting from their lower surface, and throwing up erect branches (or secondary fronds) of various shapes. *Substance* horny-membranous, destitute of calcareous matter. *Structure* unicellular, the cell continuous, strengthened internally by a spongy network of anastomosing filaments, and filled with semifluid, grumous matter. *Fructification* unknown.—CAULERPA (*Lamx.*), from *καυλος, a stem,* and *ἑρπω, to creep.*

Frons ex surculis prostratis hic illic radicantibus et ramis erectis polymorphis formata. Substantia corneo-membranacea. Structura unicellulosa, cellulæ membrana continua hyalina intus filis cartilagineis tenuissimis anastomosantibus firmata et endochromate denso viridi repleta. Fr. ignota.

CAULERPA *remotifolia;* surculus very long and slender, glabrous; fronds erect, simple, linear, two-edged, pectinato-pinnate; pinnæ distant, alternate, subulate, acute.

C. remotifolia; *surculo longissimo tenui glabro; frondibus erectis simplicibus linearibus ancipitibus pectinato-pinnatis; pinnis remotis alternis subulatis acutis.*

CAULERPA remotifolia, *Sond. in Linn. v.* 25. *p.* 660.

HAB. Lefèbre's Peninsula, *Dr. Ferdinand Mueller,* 1852.

GEOGR. DISTR. South Australia.

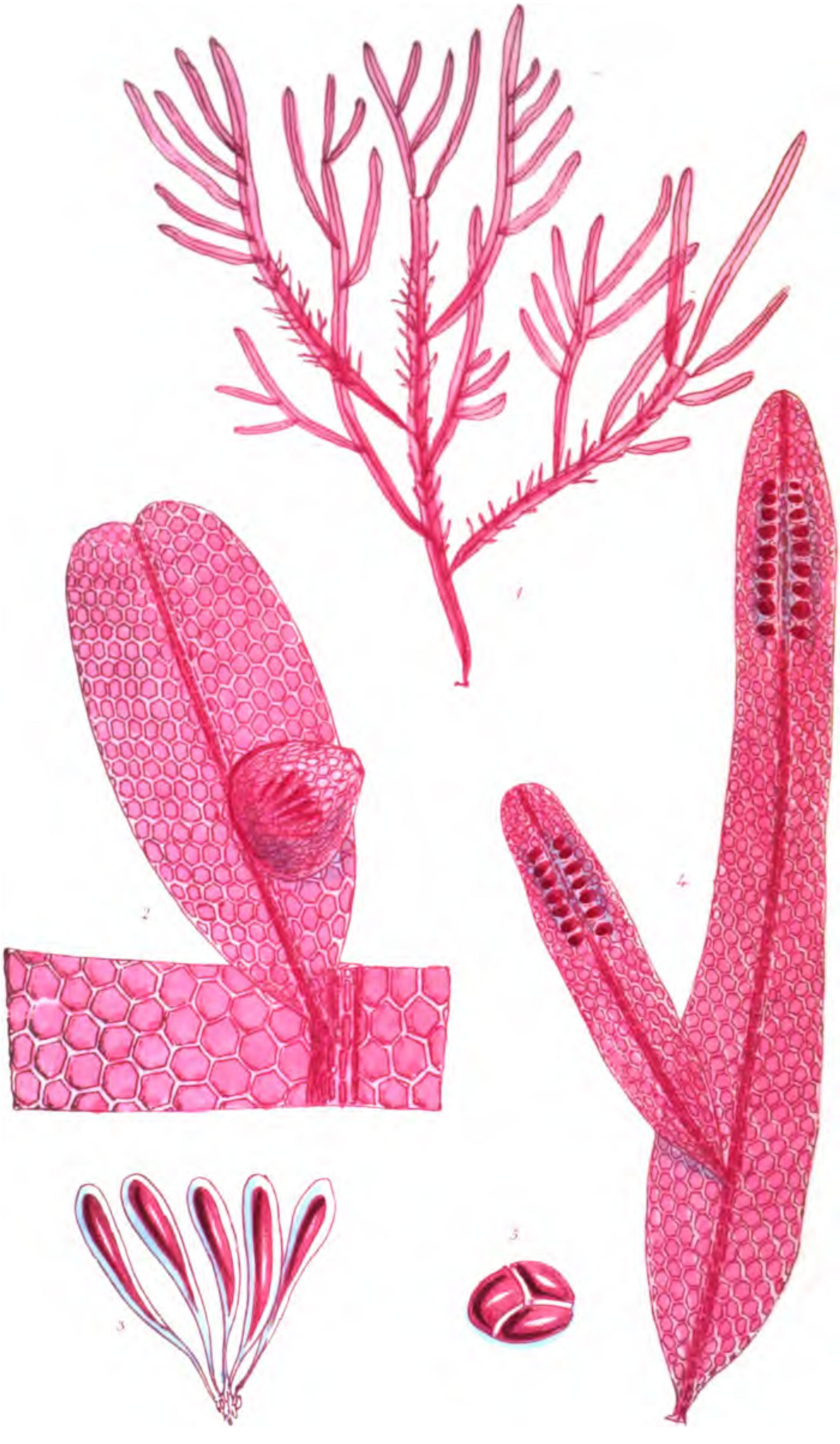
DESCR. Surculus several inches in length, as thick or twice as thick as hog's-bristle, quite glabrous, glossy, rooting at intervals of an inch or more; the roots small. Fronds 3–6 inches long, ½ line to 1 line in breadth, compressed, two-edged, quite simple or occasionally bifid, naked for an inch above the base, thence to the apex pectinated with distichous, alternate, subulate pinnæ, 1–1½ lines long, ½ line wide, 1–2 or 4–8 lines apart, erecto-patent. *Colour* a full green, becoming olivaceous in drying. *Substance* horny. In drying it very imperfectly adheres to paper.

This slender species is considered by Sonder to be allied to *C. plumaris* and *C. taxifolia,* from which it is at once known by its very distant, scattered, and somewhat differently shaped ramenta. To me its nearest affinity appears to be with *C. scal-*

pelliformis, from which it chiefly differs in its attenuated fronds and general depauperation of all characters. As yet no one has gathered it except Dr. Ferdinand Mueller, to whom I am indebted for the specimen here figured. So far as known, it is one of the rarest and most local of the Australian species.

Fig. 1. CAULERPA REMOTIFOLIA,—*the natural size.* 2. Frustule, somewhat *enlarged.*

Plate CVIII



Vincent Brooks imp.

PLATE CVIII.

AMANSIA LINEARIS, *Harv.*

GEN. CHAR. *Frond* flat, midribbed, pinnatifid or proliferous, transversely striate, membranaceous; the membrane formed of hexagonal cells, of equal length, arranged in obliquely transverse lines or striæ, destitute of cortical cellules. *Fructification:* 1, ovate or globose *ceramidia,* containing a tuft of pear-shaped spores; 2, simple or branched, marginal or superficial *stichidia,* containing *tetraspores* in a double row. —AMANSIA (*Lamour.*), in honour of M. Amans, a French phycologist.

Frons plana, costata, pinnatifida v. prolifera, transversim striata, membranacea; lamina ex cellulis oblongis hexahedris æqualibus oblique transversim ordinatis conflata; cellulis corticalibus nullis. Fruct.: 1, ceramidia; 2, stichidia marginalia v. superficialia, tetrasporas biseriatas foventia.

AMANSIA *linearis;* frond narrow-linear, obtuse, quite simple, and very entire, proliferous from the slender midrib, with leaflets of a similar form; ceramidia sessile on the midrib of minute fruit-leaves; tetraspores uniseriate, at each side of the midrib of similar fruit-leaves.

A. linearis; *fronde anguste lineari obtusa simplicissima integerrimaque e costa tenui prolifera, foliolis frondi similibus; ceramidiis ovatis tetrasporisque in sporophyllis propriis evolutis, ceramidiis in costa sessilibus, tetrasporis utroque latere costæ uniseriatis.*

AMANSIA linearis, *Harv. Alg. Austr. Exsic. n.* 118.

DELESSERIA Amansioides, *Sond. in Linn. v.* 25. *p.* 690 (? ?).

HAB. Parasitical on the smaller Algæ, especially on *Ballia callitricha.* Near the mouth of the Glenelg River, *Dr. Curdie.* Port Fairy, *W.H.H.*

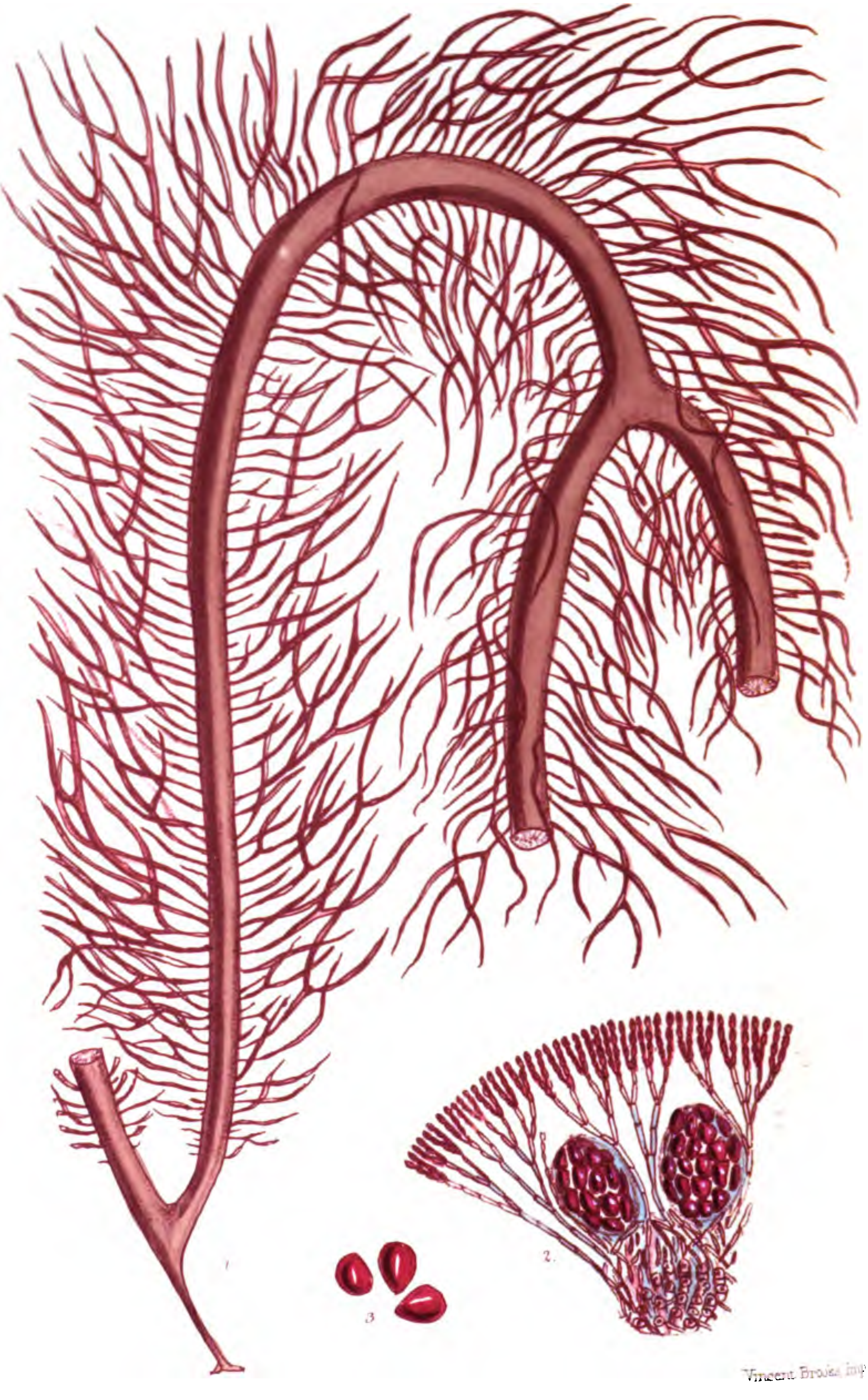
GEOGR. DISTR. South coast of Australia.

DESCR. *Root* a minute disc. *Fronds* 3–6–8 inches long, 1–1½ line in breadth, linear, tapering to an acute base, minutely stipitate, obtuse or emarginate, quite simple, with a perfectly entire and flat margin, traversed by a slender percurrent midrib. This primary or generating frond throws off from its midrib numerous similar but smaller fronds, which issue very irregularly, though frequently in secund order; these again emit others; and thus by repeated proliferous growth, a compound, much branched frond is at length formed. The lamina is composed of hexagonal cells, set in obliquely transverse lines, and of equal length and breadth. Fruit of both sorts is borne on special fruit-leaves, springing from the midribs, and resembling the primary fronds in everything but size, being rarely more than 1–4 lines long, and not ¼ line in width. The *ceramidia* are ovate, sessile on the midrib; the *tetraspores* triangularly parted, arranged in a single row at each side of the midrib, near its summit. The *colour* is a brownish red or full-red, becoming darker in drying. The *substance* is membranous, not very soft, and the frond imperfectly adheres to paper in drying.

With the habit of a hypophyllous *Delesseria* this little plant has the cellular structure and the fructification of *Amansia*, a genus which includes several subtypes, if all the plants now referred to it be suffered to remain. I have not seen any specimens of Sonder's *Delesseria Amansioides*, which I doubtfully refer, from his description, to our plant. Externally our plants seem to agree, but Sonder describes the cellular structure to consist of a single layer of *empty* hexagonal cells, covered by a layer of superficial cellules. In my plant the lamina consists wholly of hexagonal cells, which are filled with granular, bright-red endochrome, liable, however, in the dried state, to be dissipated, when they may sometimes appear empty. I find no trace of cortical cellules; the midrib alone is polysiphonous.

Fig. 1. AMANSIA LINEARIS,—*the natural size*. 2. A sporophyll or fruit-leaflet, bearing a ceramidium. 3. Spores from the ceramidium. 4. A sporophyll, bearing tetraspores. 5. A tetraspore:—the latter figures variously *magnified*.

Plate CIX.



Vincent Brooks imp

PLATE CIX.

NEMASTOMA? COMOSA, *Harv.*

GEN. CHAR. *Frond* compressed or flattened, between fleshy and gelatinous, dichotomous or subpinnate, composed of two strata; the medullary stratum formed of longitudinal, interwoven, subsimple filaments, the peripheric of excurrent, dichotomo-fastigiate, articulate filaments, moniliform toward the apices, and lying in lax or firm gelatine. *Fructification:* 1, *favellæ* immersed below the cortical filaments, containing within a gelatinous periderm numerous roundish spores; 2, cruciate *tetraspores* dispersed among the cortical filaments.—NEMASTOMA* (*J. Ag.*), from *νημα, a thread,* and perhaps *ιστημι,* in its senes of to *strengthen* or *standfast?*

Frons compresso-plana, gelatinoso-carnosa, dichotoma v. vage pinnata, duplici strato constituta; strato medullari filis longitudinalibus simpliciusculis intertextis, peripherico filis excurrenti-verticalibus dichotomo-fastigiatis articulatis apicem versus moniliformibus, muco laxiori v. solidescente cohibitis contexto. Fruct.: 1, *favellæ simplices, infra fila peripherica immersæ;* 2, *tetrasporæ cruciatim divisæ, sparsæ, intra fila moniliformia nidulantes.*

NEMASTOMA? *comosa;* frond very long, linear, compressed, distantly forked; the segments elongate, simple, densely fringed with subdistichous or scattered, slender, filiform, basally and apically attenuated ramuli; cystocarps and tetraspores both immersed in the ramuli (of different individuals).

N.? comosa; *fronde longissima lineari compressa parce et distanter furcata; laciniis elongatis simplicibus ramulis gracilibus filiformibus utrinque attenuatis subdistichis sparsisve densissime comatis; cystocarpiis tetrasporisve in ramulis nidulantibus.*

NEMASTOMA? comosa, *Harv. Alg. Austr. Exsic. n.* 432.

HAB. At Philip Island, Western Port, *W. H. H.*

GEOGR. DISTR. Coast of Victoria.

DESCR. *Root* a small disc. *Frond* 4–6 feet long, compressed, 4–5 lines in breadth, forked a short way from the base, again at a foot distance, and afterwards at intervals of 12–18 inches; the *branches* occasionally quite simple, and two or more feet long. The *axils* rounded, and apices gradually attenuated. Throughout the whole frond, or its larger part, the margin is densely fringed, at intervals of a line or less, with horizontally patent, subdistichous, slender branchlets, 1½-4 inches long, and ¼–½ line, or rather more, in diameter. These *ramuli* taper to base and apex, and are sometimes simple, but more generally, like the frond itself, they are twice or thrice forked. The frond is composed wholly of *filaments;* those of the axis are longitudinal, densely packed, somewhat branched, interwoven, and lying in moderately firm gelatine; those of the periphery are many times forked, surrounded by much looser gelatine, and their coloured apices are moniliform. The *favellæ* are immersed in the ramuli, at the base of the peripheric filaments, and surrounded by a gelatinous periderm. The *tetraspores*, on separate plants, are hidden among the moniliform extremities of the peripheric filaments of the ramuli: they are *cruciate*. The *colour* when quite recent is a rather dull brownish-purple, which is soon expelled in fresh-water, and the plant fades to pale rufescent-brown. The *substance* is gelatinous and elastic, soon softening and becoming slimy in fresh-water, and in drying the frond adheres very closely to paper.

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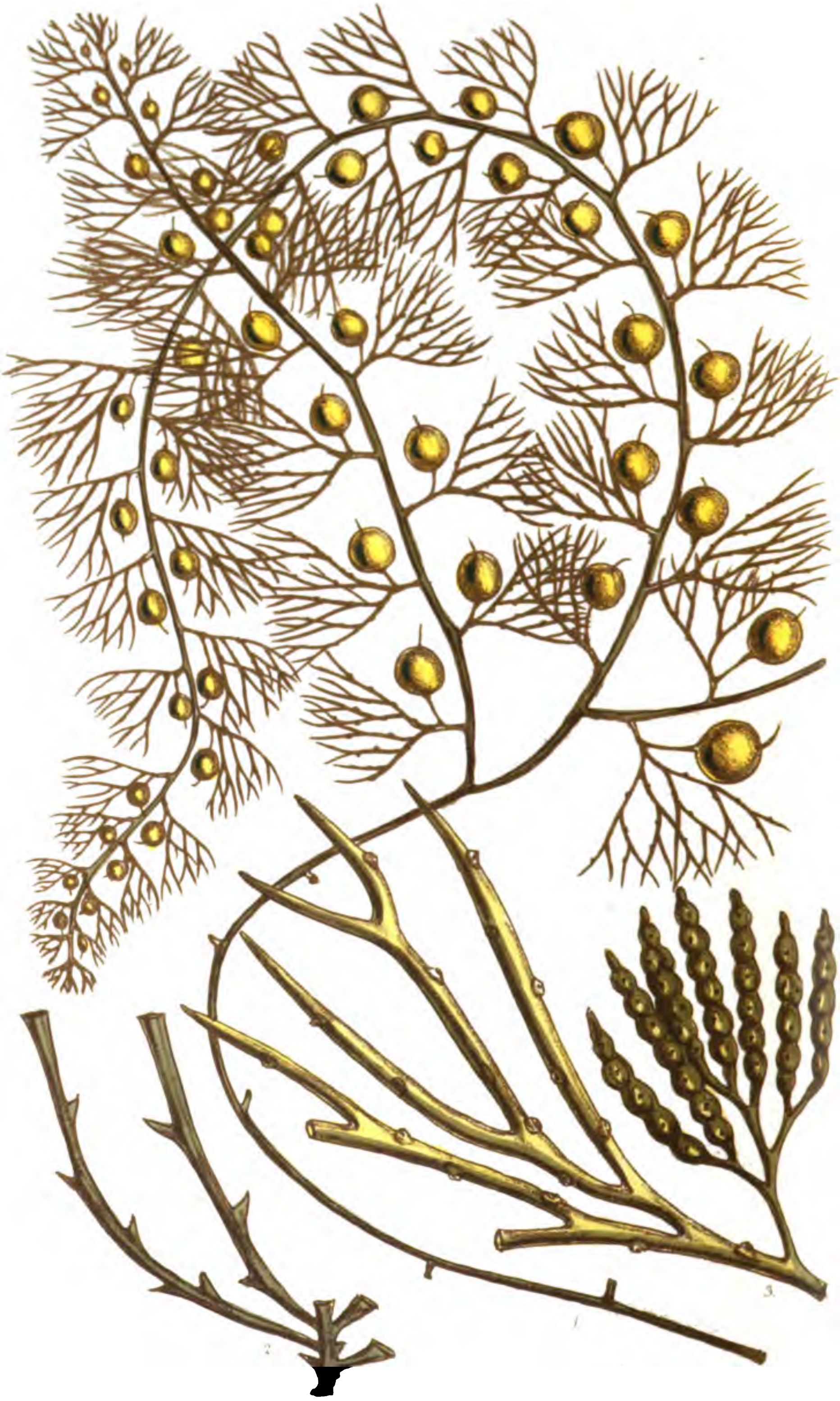
* Professor Agardh has not explained this name, which he originally (1842) spelled *Nemostoma* (Alg. Medit. p. 89); changing it to *Nemastoma* in 1847.

If this plant be correctly referred to *Nemastoma*, of which it has the fruit and general structure, it is by much the largest and finest species of the genus. Though the dichotomous branching is in some degree concealed by the distant furcations and abundance of lateral ramuli, it is nevertheless present, and exists even in the ramuli, so that our plant agrees tolerably with other species in the proper evolution of the frond. There is some similarity externally to *Helminthocladia*, but the structure of the cystocarpic fruit is very different.

When preparing the figure I had not observed *tetraspores*. They are abundantly dispersed among the moniliform filaments, forming the outer wall of the slender lateral ramuli, and occur in more luxuriant and *comose* specimens than those that bear cystocarps.

Fig. 1. NEMASTOMA? COMOSA, base of a (six feet long!) frond,—*the natural size*. 2. Segment of a transverse cutting of a ramulus, showing two favellæ lying beneath the excurrent peripheric threads. 3. Some spores:—*magnified*.

Plate CI



Vincent Brooks, Imp.

PLATE CX.

SARGASSUM RAOULII, *Hook fil. et Harv.*

GEN. CHAR. *Root* scutate. *Frond* pinnately decompound, with distinct stem, branches, leaves, vesicles, and receptacles. *Vesicles* stipitate, supra-axillary, simple, most frequently mucronate or leaf-bearing. *Receptacles* pod-like, torulose or moniliform, axillary. *Scaphidia* diœcious. *Spores* obovoid.—SARGASSUM (*Ag.*), from the Spanish *sargazo,* a name given by navigators to floating seaweed.

Radix scutata. Frons pinnatim decomposita, caule proprio, ramis, foliis, vesiculis, receptaculisque donata. Vesiculæ stipitatæ, supra-axillares, simplices, sæpissime mucronatæ v. foliiferæ. Receptacula siliquæformia, torulosa v. nodulosa, axillaria. Scaphidia dioica. Sporæ obovoideæ.

SARGASSUM *Raoulii;* stem very long, slender, smooth, strongly compressed, two-edged, angularly bent, alternately decompound; branches similar; leaves alternate, distichous, vertical, repeatedly dichotomous; the segments very narrow, linear, plano-compressed, nerveless, sparingly glandular; vesicles spherical, mucronulate, at length muticous; receptacles smooth, submoniliform, racemoso-paniculate.

S. Raoulii; *caule longissimo gracili lævi arcte compresso ancipiti angulatim flexuosa alterne decomposito; ramis similibus; foliis distichis verticalibus pluries dichotomis fastigiatis; laciniis angustissimis linearibus plano-compressis enerviis parce glandulosis; vesiculis sphæricis setaceo-mucronulatis demum muticis; receptaculis lævibus nodulosis racemoso-paniculatis.*

SARGASSUM Raoulii, *Hook. fil. et Harv. in Hook. Lond. Journ. v.* 4. *p.* 523. *Fl. N. Zeal. v.* 2. *p.* 212. *J. Ag. Sp. Alg. v.* 1. *p.* 289. *Harv. Alg. Austr. Exsic. n.* 24. *Harv. in Hook. Fl. Tasm. p.* 282.

HAB. Shores of Tasmania. Sandy Bay, *Dr. Lyall and Dr. Hooker.* South Port, *Mr. C. Stuart.* Abundant at Georgetown, *Mr. Gunn, W. H. H.* Port Arthur, *W. H. H.*

GEOGR. DISTR. Tasmania. New Zealand, *Raoul.*

DESCR. *Root* discoid. *Frond* three to six or eight feet long or more, much branched; the branches either developed alternately on a lengthened stem, or many starting near the root from a short primary stem, and constituting so many secondary stems. Both stem and branches are slender, from half a line to a line in breadth, strongly compressed and the broader two-edged, angularly bent at short intervals, gradually attenuated upwards and passing at the extremity into almost filiform prolongations. The lower part of the branch, often for a foot or more, is denuded of leaves, and armed at intervals of ½–1 inch with the spine-like remains of old petioles. The leaves are dis-

tichous and vertical, an inch or an inch and a half long, somewhat flabelliform in outline, dichotomous, divided to the base into many, almost filiform, repeatedly forked, nerveless, acute segments. In the young root-leaves alone is there any appearance of a midrib. The *glands* vary in number in specimens of different ages. The *vesicles* are spherical, of a golden yellow, borne on slender petioles, one above the axil of each leaf; the largest are 5 lines, the smaller 2–3 lines in diameter, and tipped when young with a minute setaceous point. *Receptacles* in a branching raceme or panicle, on forked pedicels; each receptacle 2–4 lines long, scarcely thicker than bristle, smooth, constricted, and somewhat moniliform, containing a single row of scaphidia. The *colour* of stem and leaves is a bright brownish-olive; that of the vesicles yellow. The *substance* is coriaceous.

This handsome plant is abundant in Tasmania, and is particularly striking whilst growing, by the profusion of bright-yellow, globose air-vessels, scattered like golden apples over the branches. The multifid leaves are unlike those of other Australian species, except *S. varians*, which differs in the broader, nerved, more pinnatifid and not fastigiate leaves, and in general aspect.

Fertile specimens of *S. Raoulii* are either very rare or confined to deep water. Where it grows at Georgetown it is quite barren.

Fig. 1. SARGASSUM RAOULII, small portion of a branch, with ramuli, leaves, and vesicles. 2. Base of stem and branches :—both of the *natural size*. 3. Receptacles and part of a leaf,—*enlarged*.

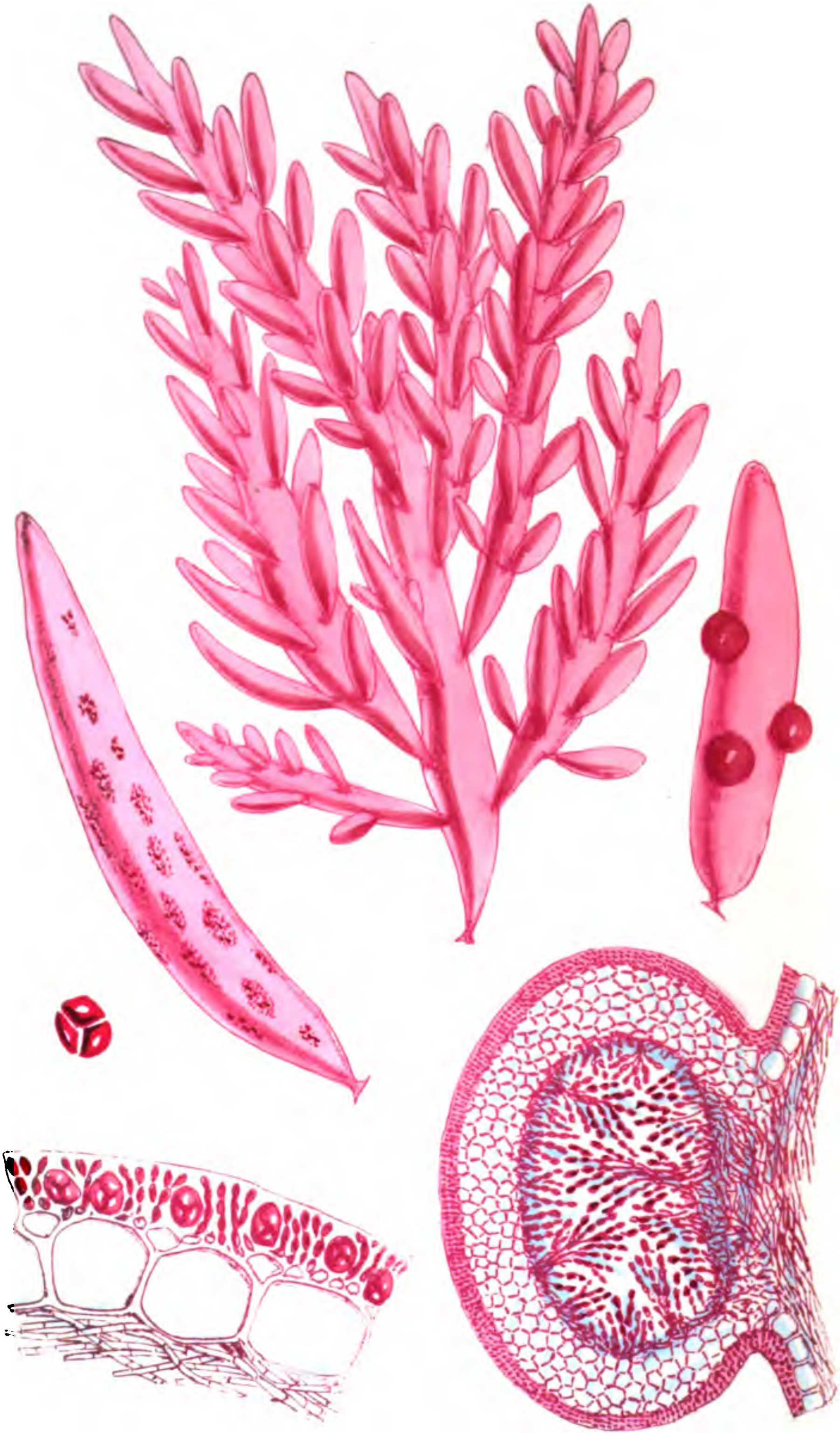


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PLATE CXI.

BINDERA SPLACHNOIDES, *Harv.*

GEN. CHAR. *Frond* bag-like, proliferous, filled with transparent fluid, membranaceous, composed of three strata; the *medullary* stratum of interwoven, longitudinal filaments; the *intermediate* of a single row of large subquadrate cells; the *cortical* of minute, coloured cellules, in few rows. *Fructification:* 1, external, globose, sessile *conceptacles,* containing numerous parietal tufts of moniliform spore-threads; 2, triangularly parted *tetraspores,* in definite, scattered *sori.*—BINDERA* (*Harv.*), in honour of Dr. Nicholas Binder, Bürgermeister of Hamburg, a patron of botany, and possessor of one of the finest collections of Algæ in Europe.

Frons saccata, prolifera, succo hyalino repleta, membranacea, stratis fere tribus contexta; strato medullari filis articulatis intertextis longitudinalibus, intermedio cellulis magnis subquadrilateris uniseriatis, corticali cellulis minimis coloratis pauciseriatis constante. Fruct.: 1, *conceptacula (desmiocarpia) in frondem sessilia, globosa, fasciculos parietales plures filorum sporiferorum foventia;* 2, *tetrasporæ triangule divisæ, in soros definitos superficiales collectæ.*

BINDERA *splachnoides,* Harv.

HAB. Discovered at Garden Island, near Fremantle, *G. Clifton, Esq.*

GEOGR. DISTR. Western Australia.

DESCR. *Root* a small disc. *Frond* 3–6 inches long, cylindrical, slightly narrowed to the obtuse extremity, constricted at the base into a minute, setaceous stipes, bag-like, filled with transparent, watery gelatine, at first perfectly simple, but afterwards emitting irregularly from its sides and apex similar bag-like, simple fronds, and thus eventually becoming proliferously much branched. Every branch is a repetition of the primary frond, to which it is attached by a minute stipes. The very young fronds are traversed with longitudinal filaments, laxly set in watery gelatine; the older become saccate, the filaments being confined to the inner side of the membranous wall of the frond, where they constitute the inner or *medullary* stratum. Outside this filamentous matrix is a single row of large, empty, quadrate cells, and these are protected externally by a very thin cortical layer, formed of a few rows of minute, coloured cellules, imperfectly arranged in moniliform sets. The *conceptacles* are scattered on the younger branches, and are very prominent, slightly constricted at base, and depressedly globular; their pericarp is thick, its walls composed of a network of filaments, from which spring into the internal cavity the numerous parietal spore-tufts, composed of beaded strings of spores. The placentæ project irregularly into the cavity, some being very short, others longer, and some almost dendroid. The *tetraspores* are collected in oblong, defined *sori* or spots, scattered over the frond; they are triangularly parted, and lodged among the cellules of the cortical layer. The *colour* is a delicate rose-red, becoming rather darker in drying. The *substance* is gelatinoso-membranaceous, and the plant in drying adheres closely to paper.

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* *Bindera,* J. Ag., is the same as *Spyridia,* Harv.

This is a very remarkable plant, having the general habit, the colour, and the substance of a *Halymenia*, or of *Chrysymenia enteromorpha*, but with external *cystocarps* of the structure nearly of those of *Chætangium*, to which genus it is therefore most allied. From *Chætangium*, however, it differs in cellular structure and gelatinous substance, in the very prominent, not depressed or semi-immersed cystocarps, and especially in the *tetrasporic* fruit, the *tetraspores* being triangularly divided and grouped together in definite spots or sori, as they are in *Nitophyllum*.

That it constitutes the type of a perfectly distinct new genus can scarcely be doubted, and I gladly take this opportunity of paying an old debt, by inscribing it with the name of Dr. Binder, of Hamburg, an enthusiastic admirer of Algæ, the possessor of a noble collection, which he freely opens for the use of all interested in this branch of botany, and to whom I am personally under obligation for repeated contributions of valuable specimens. The plant formerly named *Bindera insignis* by Professor J. Agardh, and which had previously been named *Hypnothalia Wightii* by Greville, is a species of the older genus *Spyridia*.

Fig. 1. BINDERA SPLACHNOIDES,—*the natural size*. 2. A branch, containing sori. 3. Section through the membrane of the same, showing tetraspores *in situ*. 4. A tetraspore. 5. A branch, with conceptacles. 6. A section through a conceptacle:—the latter figures variously *magnified*.

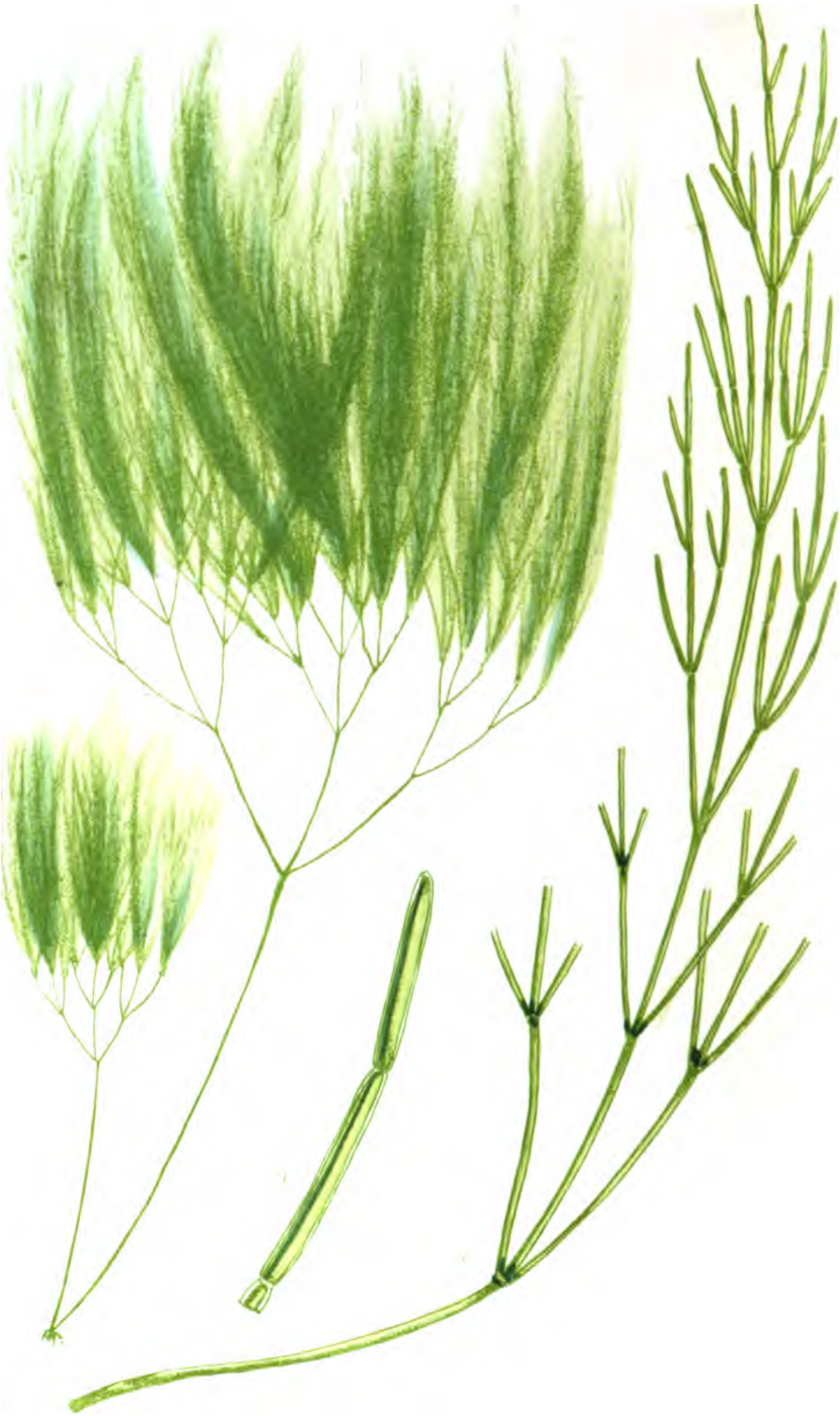


PLATE CXII.

CLADOPHORA BAINESII, *F. Muell. et Harv.*

Gen. Char. *Filaments* tufted, articulated, uniform, branched. *Articulations* filled with green, granular endochrome, which is changed at maturity into zoospores.—Cladophora (*Kütz.*), from *κλαδος, a branch*, and *φορεω, to bear.*

Fila cæspitosa, articulata, ramosa. Articuli endochromate viridi grumoso, demum in zoosporos mutato, repleti.

Cladophora *Bainesii;* yellow-green, glossy when dry, very soft, with a long stipes; filaments setaceous at base, then capillary and very much attenuated upwards, elongate, di-trichotomously much branched; branches trichotomo-multifid, set with multifid lateral ramuli; ultimate branchlets long and filiform, acute or mucronate; articulations of the branches very long, cylindrical, 20–30 times longer than broad, constricted at the joints of the ramuli, 6–10 times as long as broad.

C. Bainesii; *longiuscule stipitata, flavo-viridis, siccitate vitreo-nitens, mollissima; filis basi setaceis mox capillaribus sursum maxime attenuatis elongatis di-trichotomis ramosissimis; ramis trichotomo-multifidis ramulis lateralibus polychotomis onustis; ramulis ultimis longe filiformibus apice acutis mucronatis, articulis ramorum longissime cylindraceis diametro* 20–30-*plo longioribus ad genicula constrictis, ramulorum diametro* 6–10-*plo longioribus.*

Cladophora Bainesii, *F. Muell. et Harv. Harv. Alg. Exsic. Austr. n.* 579.

Hab. Port Phillip, *Mr. Baines, W. H. H.* Georgetown, Tasmania, *Mr. Gunn, W. H. H.*, etc.

Geogr. Distr. Victoria, Tasmania.

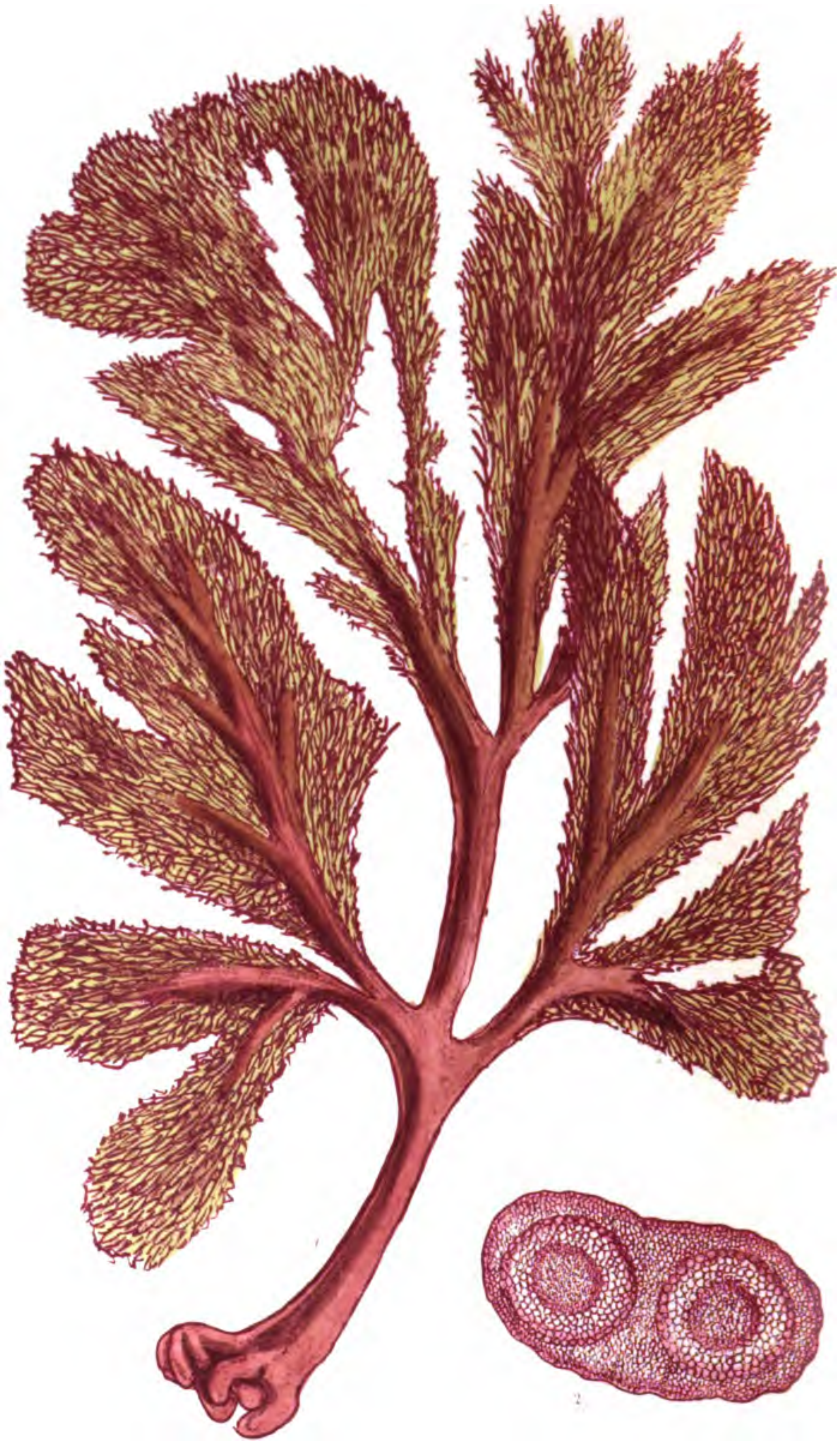
Descr. *Root* a small disc. *Filaments* 6–10 inches long, tufted, the basal cell or *stipes* rising without branch or dissepiment for 2–3 inches, then three-forked, and afterwards repeatedly di-trichotomous and multifid. The stipes is nearly as thick as hog's-bristle, and somewhat rigid; the branches into which it first divides are capillary, growing more slender at every node, and soon the filament becomes excessively slender, more frequently branched, very soft, and the order of ramification not easily distinguishable. The *articulations* throughout the filament are of great length, cylindrical, filled with endochrome; those of the lower forkings filiform, 40–50 times as long as broad; those of the upper gradually shorter, and towards the ends of the branches 10–20 times: in the ramuli they are 8–10 times, slightly constricted at the nodes, the terminal cell obtuse. The *colour* is a pale yellow-green, glossy when dry. The *substance* is very soft, silky, and flaccid, and in drying the plant adheres pretty closely to paper.

In ramification, and in the great length of the articulations, this elegant species agrees with *C. Feredayi* (Plate XLVII.), from which it differs in being of smaller size, in the much greater tenuity of the filaments and especially of the upper branches and ramuli, in the very soft substance and yellow-green colour. It is not likely to be confounded with any Australian species, but agrees in several respects with some from Japan; and in ramification with the European *C. pellucida* and its allies.

The first specimens I saw were observed in a book of carefully dried and well selected Algæ, prepared by Mr. Baines, of Melbourne, for exhibition in the Victorian "Crystal Palace," and which were, I believe, afterwards contributed to the Paris Exhibition of 1855. The book was sent to Dr. Ferd. Mueller and myself for our inspection, previous to being forwarded to the Exhibition, and we agreed to affix Mr. Baines's name to this new species of his discovery.

Fig. 1. CLADOPHORA BAINESII,—*the natural size.* 2. Portion of the upper extremity of a branch. 3. Cells from a ramulus :—the latter figures *magnified.*

Plate CII.



Vincent Brooks Imp.

Ser. Rhodospermeæ. Fam. *Gelidiaceæ?*

Plate CXIII.

THAMNOCLONIUM FLABELLIFORME, *Sond.*

Gen. Char. *Frond* dendroid or flabelliform, compressed or plane, imperfectly costate, rigidly horny or coriaceous, mostly covered with spinous tubercles, composed of two strata; the *medullary* stratum very dense, of slender, cylindrical, longitudinally seriated cellules; *cortical* of roundish-angular, coloured cells. *Fructification:* 1, *cystocarps?;* 2, cruciate *tetraspores,* contained in *nemathecia.*—Thamnoclonium (*Kütz.*), from *θαμνος, a shrub,* and *κλων, a branch.*

Frons dendroidea v. flabelliformis, compressa v. plana, immerse costata, rigide cornea et coriacea, sæpissime spinuloso-verrucosa, stratis duobus composita; strato medullari densissimo, cellulis cylindraceis gracilibus longitudinaliter seriatis; corticali cellulis rotundato-angulatis coloratis formato. Fruct.: 1, *cystocarpia ignota;* 2, *tetrasporæ cruciatim divisæ, in nematheciis propriis evolutæ.*

Thamnoclonium *flabelliforme;* frond stipitate, flabelliform, entire or divided, the lamina sponge-like, formed of closely interlaced, anastomosing, rigid fibres.

T. flabelliforme; *fronde stipitata flabelliformi integra v. partita, lamina spongiæformi ex fibrillis rigidis densissime intertextis anastomosantibusque constituta.*

Thamnoclonium flabelliforme, *Sond. in Lehm. Pl. Preiss. v.* 2. *p.* 185. *Harv. in Trans. R. I. Acad. v.* 22. *p.* 537. *Harv. Alg. Austr. Exsic. n.* 153.

Hab. Cast ashore near Fremantle, *Preiss, Clifton, W. H. H.*

Geogr. Distr. Western Australia.

Descr. *Root* clasping, with 4–5 short, thick branches. *Stem* simple, or dividing into several, 2–3 inches high, 2–5 lines in diameter, slightly compressed, rigid and woody, compressed upwards, bifid or trifid, passing into the base of a flabelliform lamina, through which it is continued as a more or less evident, immersed, subdichotomous costa. This *costa* forms the groundwork or axis of the fan-shaped lamina, and is solid, and at first naked, but it emits from its surface slender filiform processes, which soon anastomose and cover it up in a reticulated stratum; and also throws off from its edges similar but much longer processes which, extend, interweave, and anastomose, until a thick, sponge-like, fibro-cribrose body is gradually formed. This sponge-like lamina is 5–10 inches long, 3–8 inches wide, broadly obovate-cuneiform or subrotund, simple or divided into several vertical lobes, fastigiate, with a rounded outline. In old specimens small fruit-leaves (*sporophylla*) are irregularly emitted from the surface of the spongy network; these are 2–4 lines long, flabelliform, bifid or twice forked, and perfectly glabrous, and they bear in their upper half roundish

nemathecia, developed at both surfaces, and containing minute *cruciate* tetraspores, hidden among short, vertical fibres. The *colour* is probably a full, dark brownish-red, but in all our specimens has considerably faded, and partly changed into dull-green. The *substance* is extremely hard and rigid, and the plant shows no tendency to adhere to paper in drying.

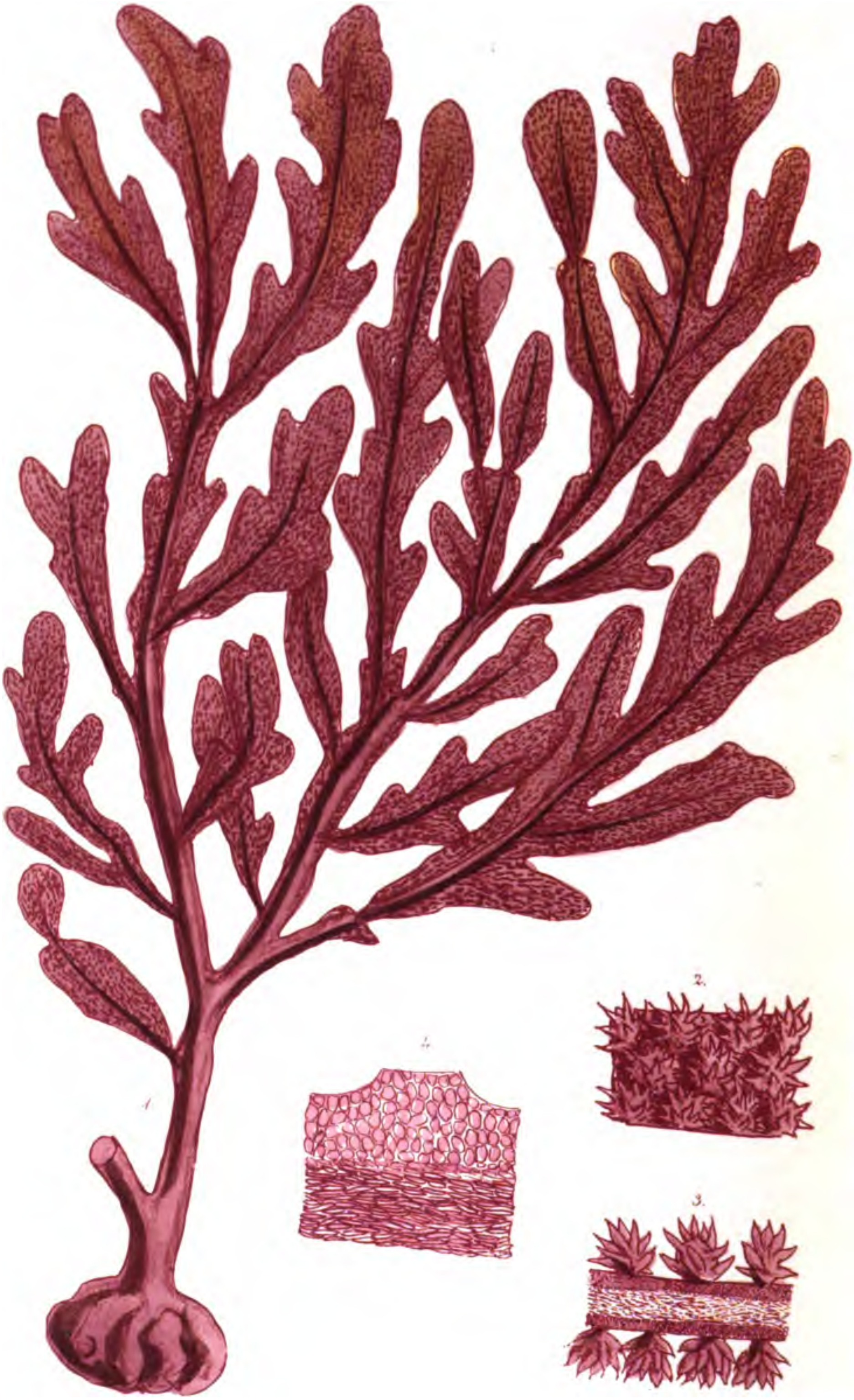
A very curious and rare Alga, whose peculiarly sponge-like structure is but imperfectly given in our rudely executed figure, which otherwise tolerably represents one of the larger and more divided specimens in the Dublin herbarium. The mode of evolution of the frond has yet to be ascertained. Judging by the few specimens I have seen, and which are in different stages of growth, I am disposed to think that the frond at an early stage is solid, and perhaps smooth, but soon becomes covered over with slender, anastomosing fibrils, which extend chiefly laterally, and form the flattened, spongy lamina. Very old fronds produce numerous small, flabelliform or forked leaflets on the surface of the spongy frond, and in these, after the figure had been completed, I detected *tetraspores*, lodged in discoid nemathecia. No other fructification has yet been observed.

I am indebted to Dr. Sonder for a fragment of Preiss's original specimen, and to my often-mentioned and liberal friend George Clifton, for the specimen here drawn, and others in various states. All bear the marks of long exposure to the weather, and are much faded.

As the *cystocarpic* fruit of *Thamnoclonium* is still unknown, the exact affinities of the genus cannot be determined, but the structure of the frond is so similar to that of the denser genera of *Gelidiaceæ*, particularly of the group *Chætangieæ*, that I have little hesitation in associating it with that family. At any rate it is far removed from *Polyphacum*, with which Agardh placed the species known to him.

Fig. 1. THAMNOCLONIUM FLABELLIFORME,—*the natural size.* 2. Transverse slice through one of the fibres of the spongy network, showing two axes, sunk in a common cellular substance, and which would probably be resolved into two fibres, the cellular matrix disappearing?—*magnified.*

Plate CXII.



Vincent Brooks, Imp.

PLATE CXIV.

THAMNOCLONIUM LEMANNIANUM, *Harv.*

GEN. CHAR. *Frond* dendroid or flabelliform, compressed or plane, imperfectly costate, rigidly horny or coriaceous, mostly covered with spinous tubercles, composed of two strata; the *medullary* stratum very dense, of slender, cylindrical, longitudinally seriated cellules; *cortical* of roundish-angular, coloured cells. *Fructification:* 1, *Cystocarps?;* 2, cruciate *tetraspores,* contained in *nemathecia.*—THAMNOCLONIUM (*Kütz.*), from *θαμνος, a shrub,* and *κλων, a branch.*

Frons dendroidea v. flabelliformis, compressa v. plana, immerse costata, rigide cornea et coriacea, sæpissime spinuloso-verrucosa, stratis duobus composita; strato medullari densissimo, cellulis cylindraceis gracilibus longitudinaliter seriatis; corticali cellulis rotundato-angulatis coloratis formato. Fruct.: 1, *cystocarpia ignota;* 2, *tetrasporæ cruciatim divisæ, in nematheciis propriis evolutæ.*

THAMNOCLONIUM *Lemannianum;* frond dendroid, the stem cylindrical; branches winged below, expanding upwards into flat, strongly midribbed phyllodia, at length proliferously much branched; phyllodia linear-cuneiform, sinuoso-pinnatifid, covered with muricated warts, and traversed by a vanishing, immersed midrib; apices and laciniæ very obtuse.

T. Lemannianum; *fronde dendroidea, caule cylindraceo; ramis basi alatis sursum in phyllodia plana costata explanatis demum prolifere ramosissimis; phyllodiis lineari-cuneiformibus sinuoso-pinnatifidis creberrime echinato-verrucosis costa evanescente immersa percursis; apicibus laciniisque obtusis.*

THAMNOCLONIUM Lemannianum, *Harv. in Trans. R. I. Acad. v.* 22. *p.* 538. *Harv. Alg. Austr. Exsic. n.* 154.

HAB. Cast ashore at Fremantle, *Mr. Mylne, W. H. H.*

GEOGR. DISTR. Western Australia.

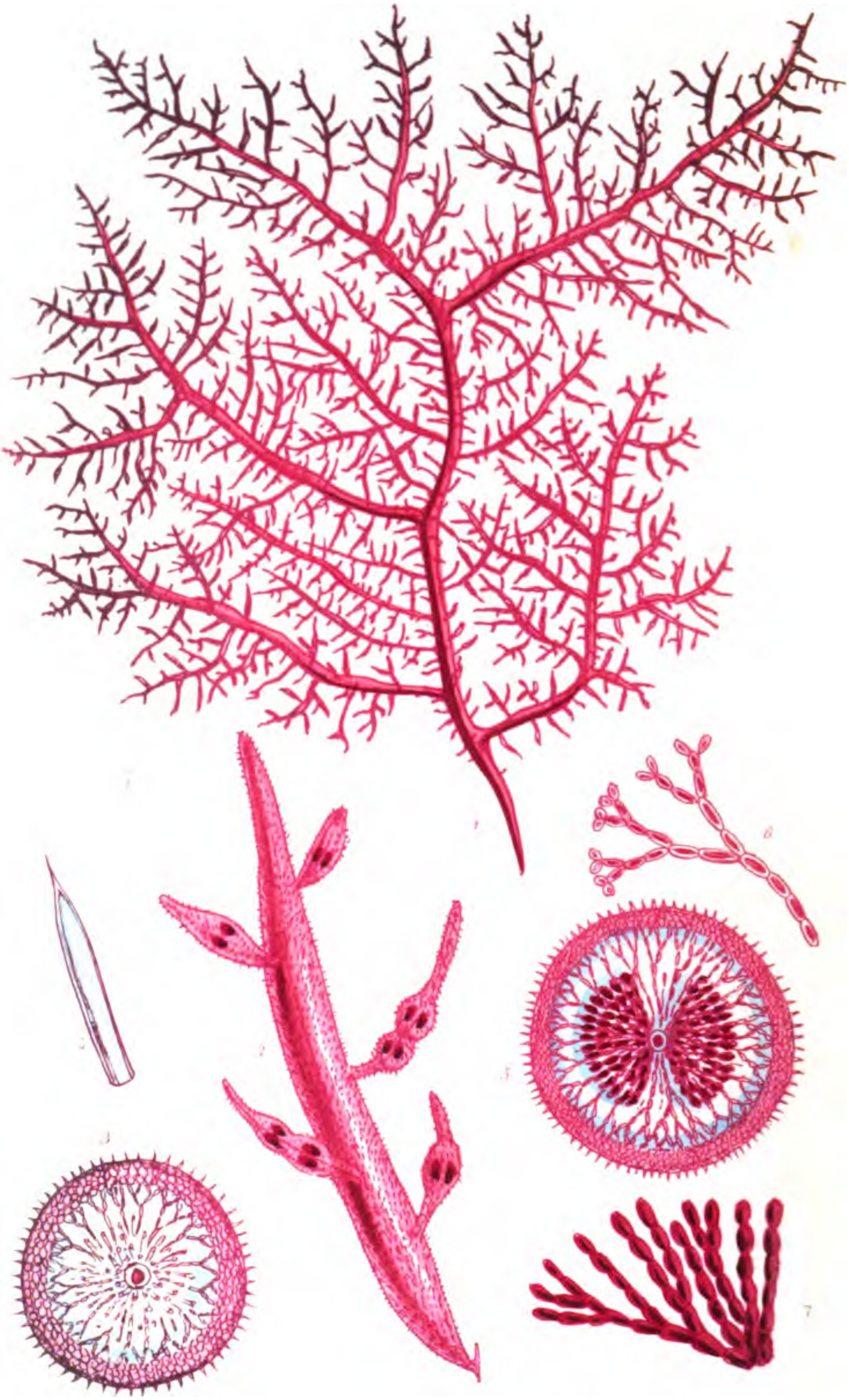
DESCR. *Root* a tuber, as large as a hazel-nut, with a few stout, clasping, short branches. *Stem* 2–4 lines in diameter, cylindrical, very hard and woody, branched; the branches dividing irregularly, soon becoming winged at the edges, and passing upwards into the bases of strongly ribbed *phyllodia. Phyllodia* 4–6 inches long, linear-oblong or subcuneate, obtuse, tapering at base, the margin either sinuate or deeply incised in an alternately pinnatifid manner; the *lobes* few and very erect, linear-oblong, obtuse, traversed by an immersed midrib, which generally becomes faint or disappears altogether beyond the middle. The surface is thickly covered with minute echinated warts, which give it a rough feel, and an appearance to the naked eye of coarse shagreen. These warts are of different sizes, small and large intermixed. No *fruit* has yet been observed. A longitudinal section of a phyllodium shows a broad and very dense and compact medullary stratum, formed of very minute and slender cylindrical cellules, placed longitudinally, and in a filiform series, but scarcely connected with definite filaments; and a narrower cortical layer of many rows of roundish, coloured cells. The *colour* is a dark brown-red, passing through dull-orange into dirty-white or greenish. The *substance* is extremely hard and rigid, and shows no tendency to adhere to paper in drying.

Our figure represents but a small portion of a proliferously much branched frond, which would more than cover a quarto plate, and which is also more thickly beset with leaf-like branches (*phyllodia*) than the figure exhibits. While the structure and rigid substance are very similar in this to what they are in *T. flabelliforme*, given in our last Plate, the habit is different. Instead of the coating of interlaced fibrils which constitute so large a part of the "*phyllodia*" in *T. flabelliforme*, we have here minute echinated papillæ, which are never developed into filaments, and merely serve to roughen the surface. Similar papillæ are found in other species, with which the present nearly agrees in habit and structure.

This is the largest and finest species of *Thamnoclonium*, and is inscribed to the memory of the late Dr. Charles Lemann, F.L.S., of London, a distinguished botanist and estimable man, to whom I am indebted for the first specimen received. It was included in a parcel of Algæ collected by Mr. Mylne, in Western Australia, and sent to me by Dr. Lemann. It seems to be of very rare occurrence, and has not as yet been sent by Mr. Clifton, in whose neighbourhood it is found.

Fig. 1. THAMNOCLONIUM LEMANNIANUM,—*the natural size.* 2. Small portion of the surface, showing the spinous tubercles. 3. Section through the frond. 4. Small portion of the same, to show the different cellular structure in the medullary and cortical layers:—the latter figures variously *magnified.*

Plate CXI



Vincent Brooks Imp

PLATE CXV.

DASYPHLŒA TASMANICA, *Hook. fil. et Harv.*

GEN. CHAR. *Frond* cylindrical, dendroid, membranaceo-cartilaginous, coated externally with microscopic hyaline hairs, and formed of a central articulated filament and two strata; the intermediate stratum composed of longitudinal, branching, excurrent filaments; the cortical membranaceous, of roundish-angular cells. *Fructification:* 1, binate *cystocarps* immersed in the ramuli, containing moniliform spore-threads issuing from a central placenta; 2, zonate *tetraspores* in wart-like nemathecia.—DASYPHLŒA (*Mont.*), from δασυς, *hairy*, and φλοιος, *bark.*

Frons cylindrica, dendroidea, membranaceo-cartilaginea, pilis minimis tota vestita, ex tubo centrali articulato stratisque duobus contexta; strato intermedio laxo, filis numerosis longitudinalibus, ramis horizontaliter excurrentibus; peripherico membranaceo cellulis rotundato-angulatis formato. Fruct.: 1, *cystocarpia binata ramulis immersa, ex filis moniliformibus sporiferis a placenta centrali radiantibus constituta;* 2, *tetrasporæ zonatim divisæ, in nematheciis verrucæformibus evolutæ.*

DASYPHLŒA *Tasmanica;* frond softly cartilaginous, rose-red, decompound, much branched; branches irregularly inserted, repeatedly divided, narrowed towards each extremity, and beset with small setaceous ramuli; cystocarps in the ramuli.

D. Tasmanica; *fronde molliter cartilaginea rosea decomposita ramosissima; ramis vage insertis patentibus pluries divisis basi et apice attenuatis ramulis setaceis fructiferis obsessis.*

DASYPHLŒA Tasmanica, *Hook. f. et Harv. in Lond. Journ. v.* 6. *p.* 406. *J. Ag. Sp. Alg. v.* 2. *p.* 216. *Harv. in Hook. Fl. Tasm. p.* 320.

HAB. Circular Head, Tasmania, *Mrs. Smith.* South Australia, *Dr. Curdie.* Port Phillip Heads, *Mrs. Mallard, W.H.H.*

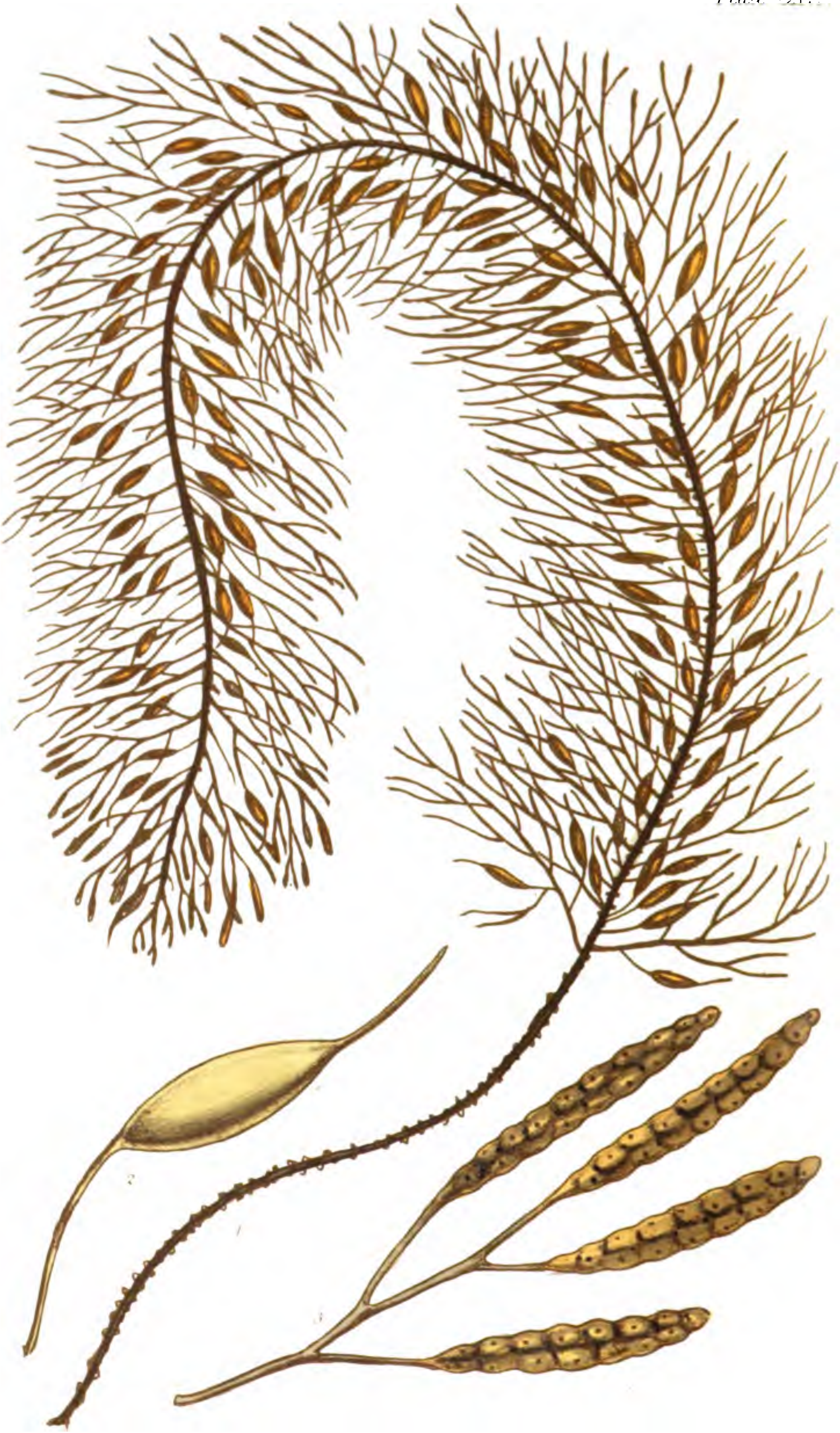
GEOGR. DISTR. South coast of Australia.

DESCR. *Root* discoid. *Frond* 6–10 inches long, and as much in the expansion of the branches, very irregular in ramification. The principal stem is either simple and percurrent or it divides into two or more leading branches, which are either simple or forked. These throw off laterally, at very short intervals, numerous secondary, very patent or horizontal branches of unequal length, partly distichous, partly irregularly spiral in insertion, tapering at base and apex, flexuous and subacute. In like manner a third and fourth series of shorter and subdistichous branchlets are given off; the ultimate ramuli being setaceous, 2–3 lines long, more or less numerous. *Cystocarps* are formed, two together, in the ultimate ramuli, which then become fusiform; they consist of moniliform strings of spore-threads issuing from a placenta surrounding the central axile filament of the branchlet, which remains nearly unchanged in structure. *Nemathecia* have not been seen. The whole surface of the frond is coated with very minute, unicellular, taper-pointed hairs, visible only under a considerable magnifying power. *Colour* a full rosy-red, becoming darker in drying. The substance is soft, but cartilaginous, not very tender, and the frond in drying adheres closely to paper.

The genus *Dasyphlœa* was founded by Montagne on an Alga from New Zealand, closely allied to the subject of the present Plate, if indeed it be specifically distinct; and the generic character, as first given, was chiefly based on the presence of the microscopic pubescence alluded to in the generic name. As such pubescence is very unusual among the Algæ, it serves at once to *mark* the genus, which is further distinguished by peculiarities of structure and fructification that fully bear out Dr. Montagne's decision. The natural affinities of *Dasyphlœa* appear to me to be rather with *Rhabdonia* than with *Chrysymenia*, next which it is doubtfully placed by Agardh. The *binate* arrangement of the cystocarps is peculiar, but the spore-threads resemble those of *Rhabdonia*, *Areschougia*, and *Erythroclonium;* and while the *habit* of *Dasyphlœa* is near that of *Rhabdonia*, it agrees in structure better with *Erythroclonium*. Between these genera it may be naturally placed. But whether I am right in retaining the small group to which *Rhabdonia* is referable (*Dumontieæ* of Agardh) among the *Rhodymeniaceæ*, is a question which admits of reconsideration.

Fig. 1. DASYPHLŒA TASMANICA,—*the natural size*. 2. A small branchlet, with fertile ramuli. 3. Cross section of the frond. 4. One of the superficial hairs. 5. Cross section through a fertile ramulus, showing the binate *cystocarps*. 6. One of the excurrent filaments. 7. Some *spore-threads* from the cystocarps:—the latter figures more or less *magnified*.

Plate CIII.



Vincent Brooks Imp.

PLATE CXVI.

CYSTOPHORA CEPHALORNITHOS, *J. Ag.*

GEN. CHAR. *Root* scutate. *Frond* pinnately decompound, dendroid, with a distinct stem, branches, and ramuliform leaves. *Vesicles* stipitate, simple, rarely absent. *Receptacles* pod-like; torulose or moniliform, developed in the ramuli. *Scaphidia* hermaphrodite. *Spores* obovoid. —CYSTOPHORA (*J. Ag.*), from *κυστις, a bladder,* and *φορεω, to bear.*

Radix scutata. Frons pinnatim decomposita, dendroidea, caule proprio, ramis foliisque ramuliformibus donata. Vesiculæ stipitatæ, simplices, raro nullæ. Receptacula siliquæformia, torulosa v. nodulosa, apice ramulorum evoluta. Scaphidia hermaphrodita.

CYSTOPHORA *cephalornithos;* stem terete, simple, warted; branches issuing from all sides, pinnately divided; ramuli filiform, the uppermost changed at their summits into terete receptacles; vesicles fusiform, setaceo-mucronate, issuing from the stem or larger branches.

C. cephalornithos; *caule terete simplici verrucoso; ramis undique egredientibus pinnatim v. bipinnatim ramosis; ramulis filiformibus, ultimis in receptacula teretia lævia abeuntibus; vesiculis fusiformibus setaceo-aristatis e caule ramisque majoribus enatis.*

CYSTOPHORA cephalornithos, *J. Ag. Sp. Alg. v.* 1. *p.* 246. *Harv. Alg. Austr. Exsic. n.* 12.

CYSTOSEIRA cephalornithos, *Ag. Syst. p.* 291.

FUCUS cephalornithos, *Labill. Pl. Nov. Holl. t.* 261.

HAB. At Cape Van Diemen, *Labillardière.* Port Phillip, *Areschoug.* Mouths of Glenelg River, *Dr. Curdie.* Port Fairy and Western Port, Victoria, *W. H. H.*

GEOGR. DISTR. South coast of Australia.

DESCR. *Root* a small disc. *Fronds* tufted, 2–3 feet long. *Stem* filiform, ½–¾ line in diameter, simple, denuded in its lower part, and there warted or muricated with the remains of old branches, densely beset in its upper half with short, laterally patent or subhorizontal branches issuing to all sides. The general outline of the frond is oblong and brush-like. In smaller specimens the lateral branches are simply pinnate, with a few slender, simple, filiform ramuli; in the larger the branches are longer, 5–6 inches long, and more or less bipinnate. The *vesicles* are copious, on long or short petioles, narrow-ovoid or fusiform, tipped with a longish bristle, and they are borne, along with the branches, on the stem; in the larger specimens, however, they often occur among the ramuli on the lateral branches. The *receptacles* are simple, cylindrical, $\frac{1}{3}$–$\frac{3}{4}$ inch long, blunt, and smooth, formed in the ends of the ultimate, or occasionally of all the ramuli. The *colour* is a full dark-olive, becoming black when dry. The *substance* is coriaceous and rather flaccid.

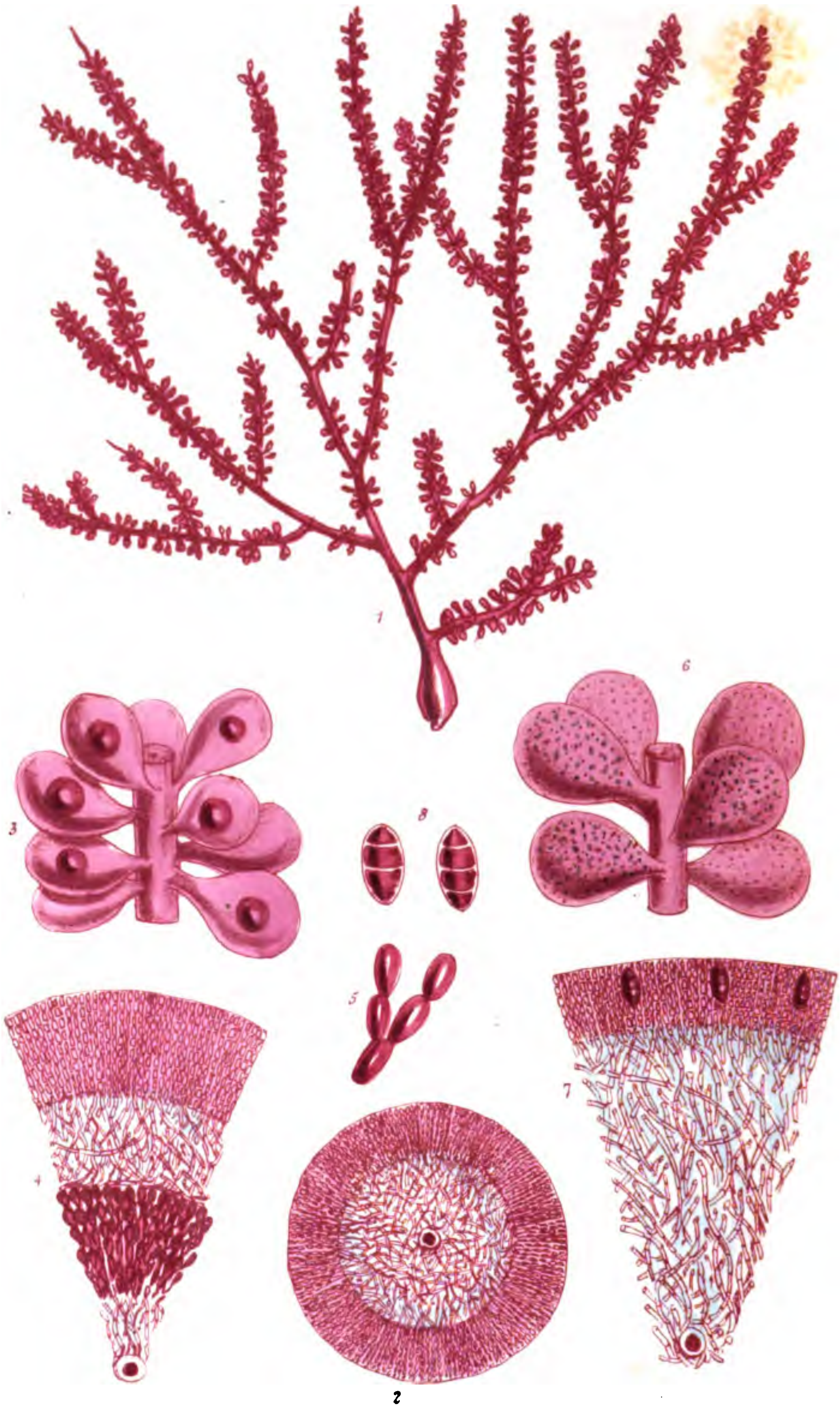
This is one of the smaller and more slender species of *Cystophora,* and not likely to be confounded with any other. It is most allied to *C. uvifera,* with which it agrees in the usual position of the air-vessels, which in these two species arise from the main branch or *rachis* of the frond, but from which it differs in the shape of the air-vessels. In *C. cephalornithos* the vesicle is shaped, as the name signifies, something like a bird's head (Fig. 2), and in *C. uvifera* it is globose, like a grape.

Our figure necessarily represents one of the smaller and younger fronds. Old specimens, from deep water, become again decompound, the ramuli shooting out into secondary *rachides,* and being closely pinnated and vesiculiferous, and in all respects repetitions of the primary frond.

This species is not uncommon on the coast of Victoria. My largest specimens were gathered at Port Fairy.

Fig. 1. CYSTOPHORA CEPHALORNITHOS,—*the natural size.* 2. A vesicle. 3. Ramuli bearing receptacles:—the latter figures *enlarged.*

Plate CXVII.



Vincent Brooks. Imp

SER. RHODOSPERMEÆ. Fam. *Rhodymeniaceæ.*

PLATE CXVII.

ARESCHOUGIA? SEDOIDES, *Harv.*

GEN. CHAR. *Frond* compressed or filiform, vaguely branched, composed of an articulated axial filament, and three (rarely but two) strata of cells; the *medullary* stratum consisting of longitudinal, anastomosing, interwoven filaments; the *intermediate* (sometimes absent) of several rows of roundish, coloured cells; the *cortical* of minute, vertically seriated cellules. *Fructification:* 1, *conceptacles* immersed in the frond, suspended among the filaments of the medullary stratum, and enclosed in a network of filaments, opening by an external pore, and containing moniliform strings of spores, radiating from a central placenta; spores roundish; 2, zonate *tetraspores,* formed on the cortical stratum of the ramuli.—ARESCHOUGIA (*Harv.*), in honour of Dr. J. E. Areschoug, Professor of Botany at Upsal, a distinguished algologist.

Frons compressa v. filiformis, vage ramosa, immerse costata, e filo centrali articulato et stratis fere tribus cellularum constituta. Stratum medullare e filis articulatis longitudinalibus anastomosantibus intertextis, intermedium (nunc deficiens) e cellulis rotundatis majusculis pluriseriatis, corticale e cellulis minimis verticalibus formatum. Fruct.: 1, *cystocarpia fronde immersa, inter fila strati medullaris suspensa, reticulo filorum velata, carpostomio demum aperta, fila sporifera moniliformia a placenta centrali emissa continentia; sporæ subrotundæ;* 2, *tetrasporæ zonatim divisæ, inter cellulas corticales ramulorum nidulantes.*

ARESCHOUGIA? *sedoides;* frond filiform, subdichotomous, or irregularly branched; branches densely set with short, obovoid or pyriform, quadrifarious ramuli; conceptacles and tetraspores formed in the ramuli (of different individuals).

A. sedoides; *fronde filiformi subdichotome v. vage ramosa; ramis ramulis brevissimis obovoideis quadrifariis onustis; fructu utriusque generis in ramulis evoluto.*

HAB. Thrown up from deep water. Near Fremantle, Swan River, *Mylne, W. H. H., G. Clifton.*

GEOGR. DISTR. Western Australia.

DESCR. *Root* thickened, somewhat bulbous. *Frond* filiform, as thick as whipcord, 4–6 inches long, and as much in the expansion of the branches, several times irregularly forked; the divisions virgate, erecto-patent, 1–2 inches long. All the younger branches are densely beset, on all sides, with minute, pear-shaped, succulent ramuli, about a line or rather more in length, irregularly inserted, and often fascicled: the older branches and stems are more or less denuded, and are then opaque and smooth. The structure of the stem is very dense, the interwoven filaments of the medullary stratum being closely packed, and the cortical layer thick, composed of radiating, slender, densely-set filaments. *Conceptacles* sunk in the medullary stratum of the ramuli, surrounding the central axile filament on all sides; the *nucleus* formed of moniliform, excurrent spore-threads; *spores* elliptical. *Tetraspores* zonate, lodged in the cortical layer of rather larger and more succulent ramuli than those that bear conceptacles. *Colour* dark-red, becoming darker in the herbarium. *Substance* cartilaginous and tough, enduring exposure and long immersion in fresh-water. In drying the frond scarcely adheres to paper, except when young.

I have long been acquainted with this plant, but until now have hesitated to describe it, from feeling uncertainty both as to the proper genus to which it should be referred, and as to whether it was fully organized, or merely some species in a denuded condition. Several specimens recently received from Mr. Clifton, some of them bearing *cystocarps,* and others *tetraspores,* have at length satisfied me that the present Alga is entitled to specific distinction; but I am still doubtful whether I ought to refer it to *Areschougia,* or perhaps found a new genus upon it. In its characters it comprises, very nearly, the genera *Areschougia* and *Erythroclonium,* but does not quite agree with either; but on the whole—looking to the development of its stem and primary branches—appears better associated with the former. Here therefore I place it, though to admit it I have been obliged to alter the generic character.

To complete its history it would be desirable to find it in a young state and growing. We are still ignorant of the form of the immature ramuli, or whether, at any period, it bears flat, foliaceous appendages.

Fig. 1. ARESCHOUGIA SEDOIDES,—*the natural size.* 2. A cross section of the stem. 3. Some ramuli, *in situ,* containing *conceptacles.* 4. Segment of a cross section of a conceptacle-bearing ramulus. 5. Spore from the same. 6. Ramuli, bearing *tetraspores.* 7. Segment of a cross section of one of them. 8. *Tetraspores* from the same:—the latter figures variously *magnified.*

Plate CXVIII

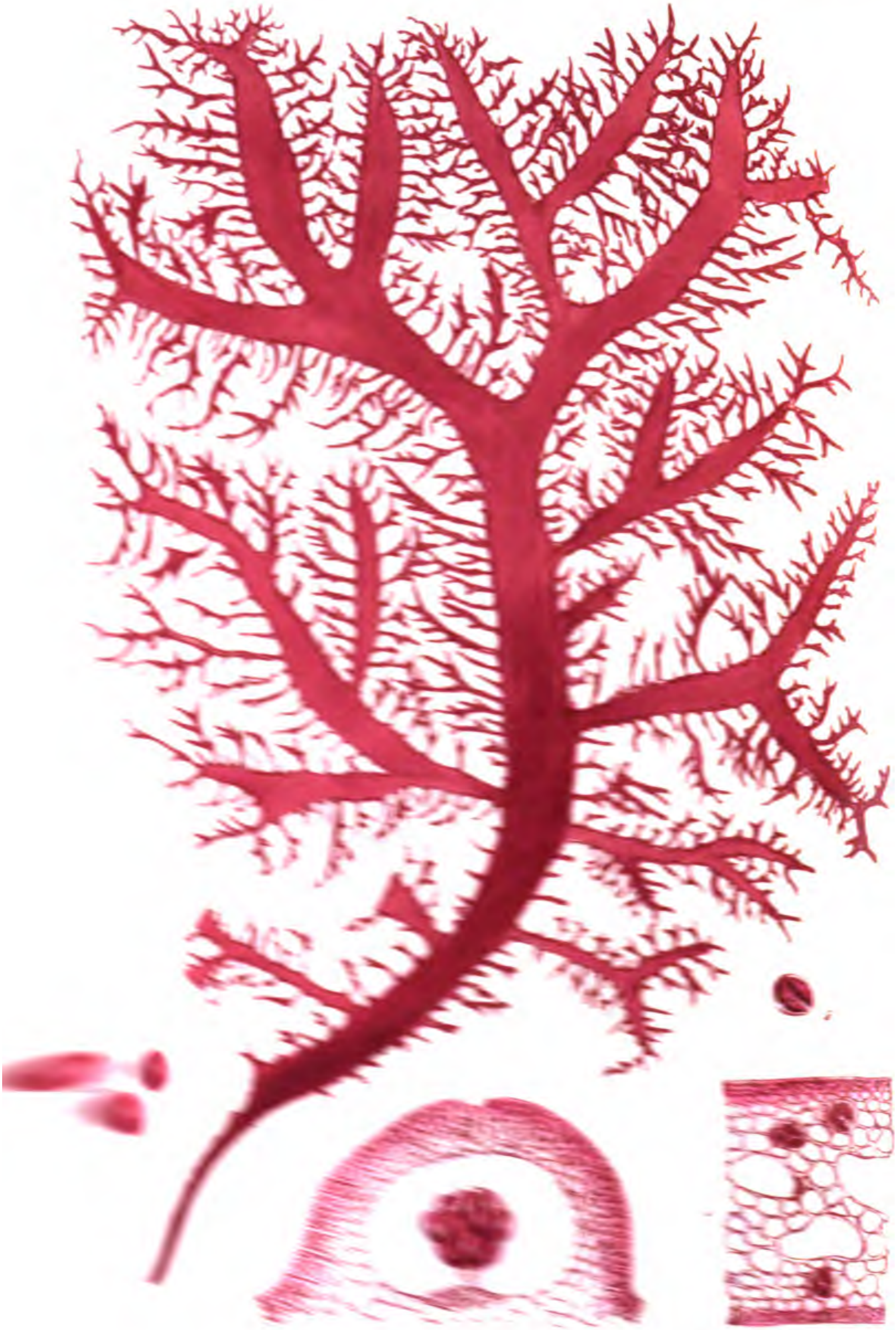


PLATE CXVIII.

HYMENOCLADIA USNEA, *J. Ag.*

GEN. CHAR. *Frond* softly membranaceous, flat, linear, distichous, decompoundly pinnated, composed of three strata of cells; the *medullary* stratum of large, roundish, inflated cells; the *intermediate* of smaller, angular cells; the *cortical* of minute, coloured cellules, arranged in vertical, moniliform series. *Fructification:* 1, *conceptacles* globose, sessile, with a thick, cellular pericarp, at length opening by an apical pore; *spore-threads* moniliform, attached to a basal placenta; the spores elliptic or oblong; 2, dispersed, tripartite *tetraspores.*—HYMENOCLADIA (*J. Ag.*), from *ὑμην, a membrane,* and *κλαδος, a branch.*

Frons gelatinoso-membranacea, plano-compressa, linearis, distiche decomposito-pinnata, stratis tribus contexta; medullari ex cellulis magnis vesicatis, intermedio ex cellulis minoribus rotundato-angulatis pluriseriatis, corticali ex cellulis minutissimis coloratis in fila brevissima moniliformia verticalia conjunctis. Cystocarpia intramarginalia, subsphærica, sessilia, pericarpio crasso cellulari demum ostiplo aperto, sporas oblongas in fila e placenta basali radiantia evolutas foventia. Tetrasporæ triangule divisæ, sparsæ.

HYMENOCLADIA *Usnea;* frond blood-red, gelatino-membranaceous, dichotomo-pinnate; rachis forked, broadly linear, narrowed at base; branches patent, ligulate, closely pectinated with horizontal, long and narrow, simple or pinnulate ramuli; cystocarps and tetraspores scattered.

H. Usnea; *fronde sanguinea gelatinoso-membranacea dichotomo-pinnata supra-decomposita; rachide sæpius furcata lato-lineari basi angustata; ramis patentibus v. divaricatis pectinato-pinnatis; pinnulis horizontalibus angustis elongatis simplicibus v. iterum pectinato-pinnulatis; cystocarpiis tetrasporisque sparsis.*

HYMENOCLADIA Usnea, *J. Ag. Sp. Alg. v.* 2. *p.* 772. *Harv. Alg. Austr. Exsic. n.* 365.

FUCUS Usnea, *R. Br. in Turn. Hist. Fuc. t.* 225.

HAB. Kent Island, *R. Brown.* Abundant at Port Phillip Heads, and Western Port, *W. H. H., Dr. Mueller, Mr. Rawlinson, etc.* Flinders Island, *Dr. Milligan.*

GEOGR. DISTR. South coast of Australia, east of Cape Northumberland.

DESCR. *Root* a small disc. *Frond* tufted, 12–16 inches long, and as much in the expansion of the branches, perfectly distichous, and much and irregularly branched in an imperfectly dichotomous order, all the divisions remarkably patent, with wide, blunt axils. The main frond varies from being several times forked to nearly simple, and from 1 to 4–6 lines in breadth; it always tapers much to the base, but does not greatly narrow upwards. The ***primary branches*** are similar to the main frond, tapering much to the base, sub-horizontally patent, simple or unilaterally or alternately lobed or branched, and 4–8 inches long. The whole margin of all the branches is closely pectinated, at distances of a line or less, with slender, narrow-linear, horizontal, simple or branching ***ramuli***, ½–1½ inches long, and rarely a line wide. Different specimens vary extremely in the minor characters of the branching, some being much more divided and ramuliferous than others. ***Cystocarps*** either marginal or scattered on the disc, produced either in the ramuli, or on the branches, having a wide cavity and few-spored nucleus; the ***spores*** elliptical, imperfectly seriated. ***Tetraspores*** lodged in the intermediate stratum, dispersed. ***Colour***, when quite fresh, a blood-red, fading on exposure or immersion in fresh-water. ***Substance*** soft, decomposing, after a time, in fresh-water. In drying the frond adheres closely to paper.

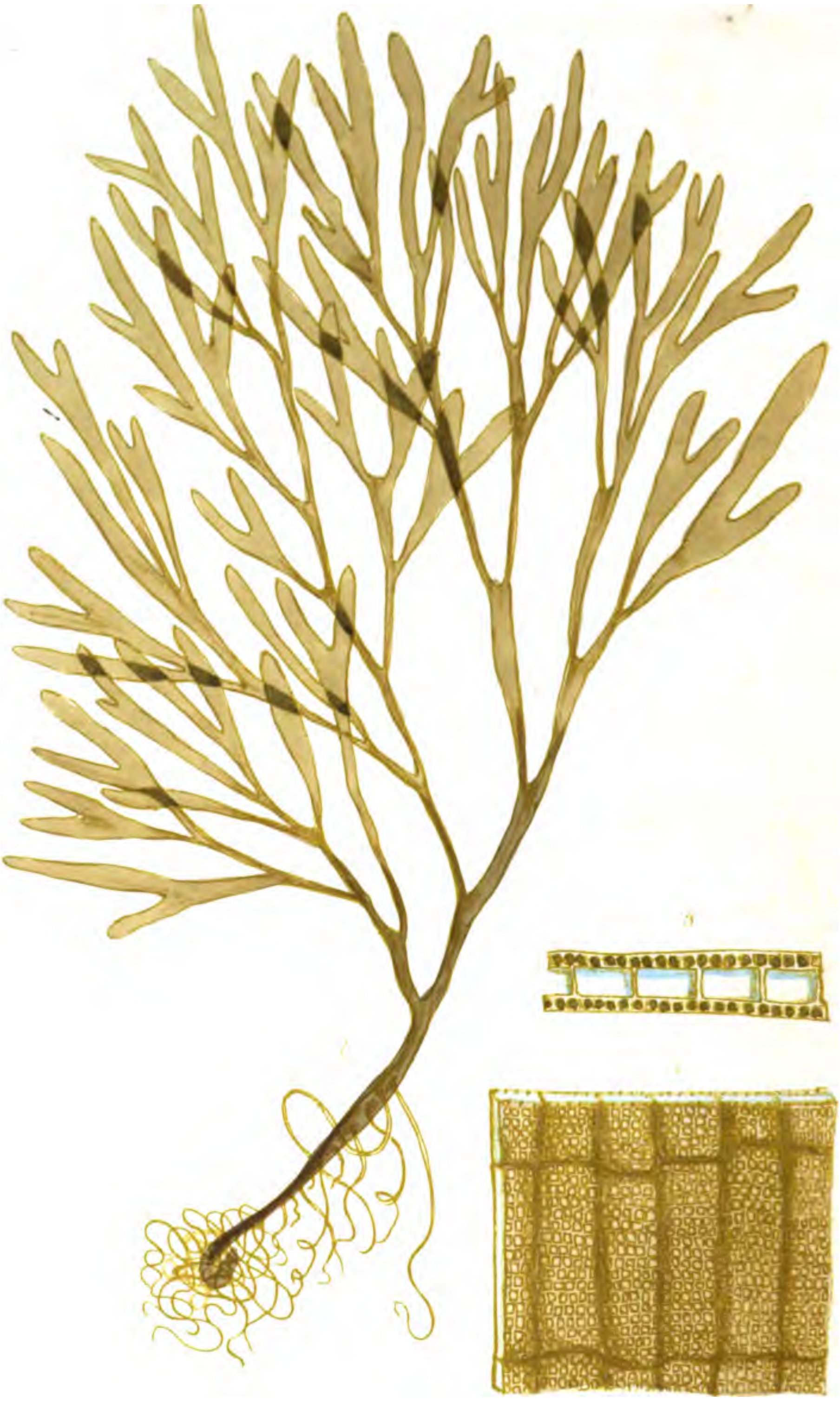
This fine species, one of the most showy of the Victorian Algæ, though long known to botanists by the figure in Turner's Hist. Fuc., was, until recently, in very few European herbaria; and though I had myself gathered some hundreds of specimens, on none did I find *cystocarpic* fruit in a mature condition. For fine specimens, in full fructification of both kinds, I have now to thank Mr. Rawlinson of Melbourne, to whom (through Dr. Mueller) I am also indebted for a suite of well-dried Algæ, collected at Port Phillip Heads.

The structure of the *nucleus* in this species and in *H. divaricata* (Plate XX.), necessitates the placing of the genus *Hymenocladia* among the *Rhodymeniaceæ* instead of the *Laurenciaceæ*, where Agardh refers it.

Our Plate has been struck in rather too dark an ink, and is more highly coloured than ordinary specimens; but when quite fresh, before exposure to the sun or immersion in fresh-water, it is of the *deep red* here represented.

Fig. 1. HYMENOCLADIA USNEA,—*the natural size.* 2. Section of a conceptacle. 3. Spores from the same. 4. Cross section of the frond, with imbedded tetraspores. 5. A tetraspore:—the latter figures variously *magnified.*

Plate CXLI.



Vincent Brooks Imp.

PLATE CXIX.

DICTYOTA RADICANS, *Harv.*

GEN. CHAR. *Root* woolly. *Frond* flat, linear, membranous, ribless, areolate, dichotomous or irregularly cleft. *Fructification: spores* superficial, either collected in spot-like sori or scattered singly over both surfaces of the frond.—DICTYOTA (*Lamour.*), from *δικτυον, a net;* because the surface, under a lens, has a netted or, rather, a tessellated appearance.

Radix stuposa. Frons plana, linearis, membranacea, ecostata, areolata, dichotoma aut vage fissa. Fruct.: sporæ superficiales, in soros maculæformes aggregatæ v. singulatim per utramque paginam frondis dispersæ.

DICTYOTA *radicans;* frond not woolly at base, stipitate, rooting by scattered thread-like fibres issuing from the stipes and lamina, dichotomo-pinnatifid; segments cuneate, the lateral erect, with narrow sinuses; apices very obtuse; sori scattered, confined to the middle part of the frond.

D. radicans; *fronde estuposa stipitata, basi fibris crassis sparsis e stipite et lamina emissis radicante dichotomo-pinnatifida; segmentis cuneatis, lateralibus erectis; sinubus angustis, apicibus obtusissimis; soris effusis, in medio parte frondis collectis.*

DICTYOTA radicans, *Harv. in Trans. R. I. Acad. v.* 22. *p.* 536; *Alg. Austr. Exsic. n.* 69.

HAB. At Rottnest and Garden Islands, near Fremantle, *W. H. H.*

GEOGR. DISTR. West Australia.

DESCR. *Root* consisting of many, long, simple, thread-like fibres, proceeding partly from the base of the frond, and partly from the lower parts of the principal rachides; the fibres as thick as hog's-bristles, and from 1 to 3 inches long. *Frond* irregularly dichotomous, the segments linear, cuneate, much attenuated at base, repeatedly forked, occasionally sub-alternately decompound, 1½–3 lines wide, quite entire, erecto-patent, with blunt axils and tips. The *areoles* of the membrane are oblong, 3–4 times longer than broad; the *superficial cellules* minute and quadrate. *Membrane* rather translucent. The *colour* is a brownish-olive, paler toward the extremities. The *substance* is membranaceous, and the frond, when not too old, adheres moderately to paper in drying.

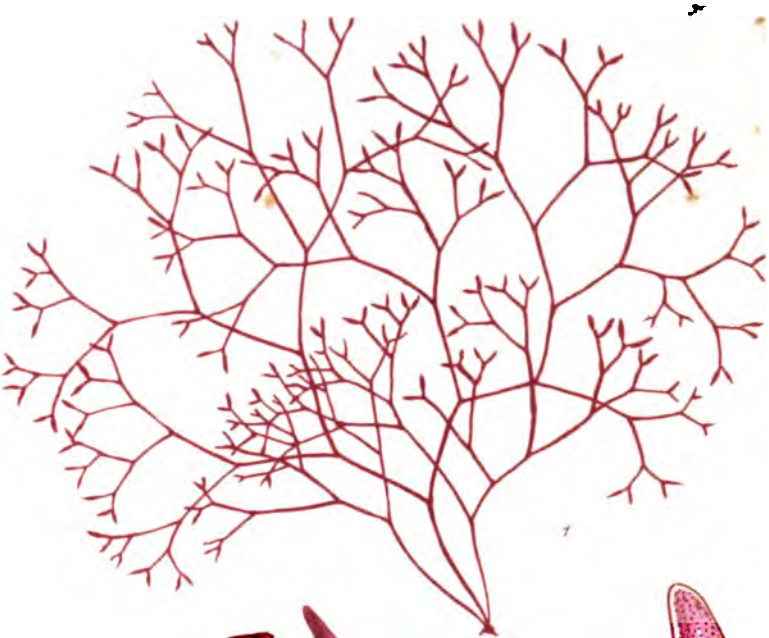
This species, which much resembles some forms of *D. dicho-*

toma in habit, differs from that and from all others of the genus *Dictyota* in wanting the woolly or stupose root; in place of which it is furnished with more or less abundant fibrils, issuing without order from the lower portion of the frond, and attaching themselves to neighbouring Algæ. Had these only been found on one or two individuals, I should probably have taken them for a mere aberration, but finding them sufficiently constant in many specimens, collected in different localities and at different times, I am induced to regard them as an essential character, by which the present species may be most easily distinguished from others.

As in *D. dichotoma*, the frond varies much in breadth, but scarcely in any other respect. Our figure represents an average specimen.

Fig. 1. Dictyota radicans,—*the natural size*. 2. Portion of the membrane, *magnified*, to show the reticulation. 3. A cross section of the same, showing the internal structure.

Plate CIV.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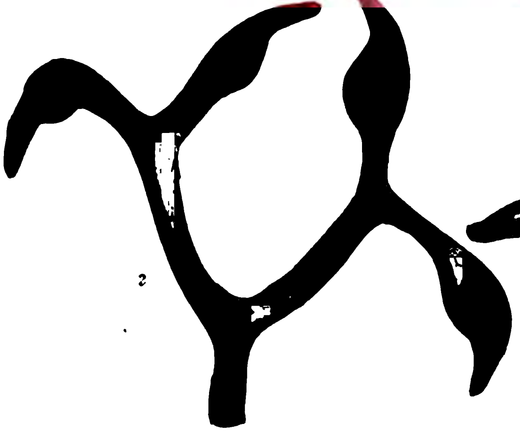
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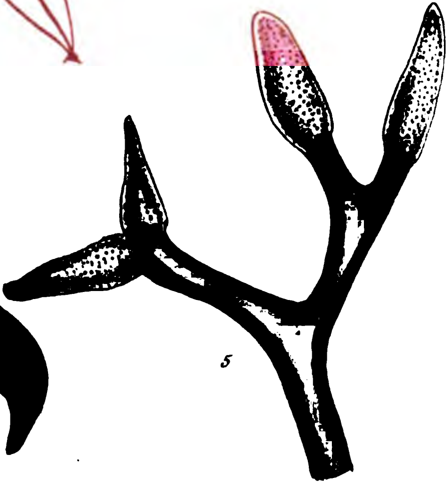
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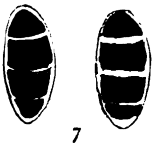
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3

4

6

Vincent Brooks Imp.

PLATE CXX.

DICRANEMA GREVILLEI, *Sond.*

GEN. CHAR. *Frond* terete, dichotomous, formed of three strata; the *medullary* stratum of slender, closely packed, longitudinal filaments; the *intermediate* of angular cells, smaller toward the circumference; the *cortical* of vertically seriated, minute, coloured cellules. *Fructification:* 1, hemispherical *conceptacles*, containing, within a thick pericarp, pedicellate, obovate spores, attached to a parietal fibro-cellular placenta (formed from the medullary stratum); 2, zonate *tetraspores*, lodged in the swollen (pod-like) tips of the branches.—DICRANEMA (*Sond.*), from *δικρανον, a fork,* and *νημα, a thread.*

Frons teretiuscula, dichotoma, stratis tribus contexta. Stratum medullare ex filis longitudinalibus tenuibus densis; intermedium cellulis rotundato-angulatis, exterioribus minoribus; corticale cellulis minimis coloratis verticaliter seriatis. Fruct.: 1, *cystocarpia hemisphærica, intra pericarpium crassum sporas obovatas pedicellatas ad placentam parietalem fibro-cellulosam foventia;* 2, *tetrasporæ zonatim divisæ, in apicibus tumidis (siliquæformibus) ramorum nidulantes.*

DICRANEMA *Grevillei;* frond (3–4 inches long) ultra-setaceous, dichotomo-fastigiate; axils widely spreading; apices patent or divaricate; conceptacles near the obtusely horn-like tip; pod-like tips (of tetraspores) erecto-patent.

D. Grevillei; *fronde* (3–4-*pollicari*) *ultra-setacea dichotomo-fastigiata; axillis patentibus; apicibus patentibus v. divaricatis; conceptaculis ab apice obtuso parum remotis; apicibus siliquæformibus tetrasporarum erecto-patentibus.*

DICRANEMA Grevillei, *Sond. in Bot. Zeit.* 1845, *p.* 56. *Pl. Preiss. v.* 2. *p.* 173. *J. Ag. Sp. Alg. v.* 2. *p.* 634. *Harv. Alg. Austr. Exsic. n.* 315.

GRACILARIA pumila, *Grev. Ed. Journ. Nat. Sc. v.* 3. *p.* 338, *cum icone.*

CYSTOCLONIUM? pumilum, *Kütz. Sp. Alg. p.* 757.

HAB. Australia, *Herb. Greville.* West Australia, *Preiss.* Abundant on *Cymodocea antarctica,* etc., near Fremantle, and at King George's Sound, *W. H. H., G. Clifton, etc.* South Australia, *Dr. Curdie.* Flinders Island, *Dr. Milligan.*

GEOGR. DISTR. West and south coasts of Australia.

DESCR. *Root* a minute disc. *Fronds* densely tufted, 2–4 inches long, thicker than hog's-bristle, many times forked, fastigiate, forming nearly globular tufts. The branching is very regular and uniform, merely varying from the occasional non-development of one of the arms of the fork; the axils are wide, but sharp, the branches and ramuli patent or divaricate. The apices are not remarkably recurved, and only show such a tendency in the cystocarpic specimens. The tips of those bearing tetraspores are quite straight, spreading, but not generally recurved, oblong or ovate-oblong. The *cystocarps* are near the bluntly acuminate end of the branch; the *spores* are obovate, on longish pedicels. *Tetraspores* zonate, very numerous, lodged in the cortical layer of the pod-like extremities. The *colour* is a deep, full red, becoming darker and duller in drying. The *substance* is rigidly cartilaginous, somewhat horny when dry, and the frond very imperfectly adheres to paper in drying.

At Plate LXXIV. is represented another species of *Dicranema* closely allied to the present, but of much smaller size, and with the tips much more strongly hooked. Notwithstanding their near affinity, I am disposed to regard these Algæ as sufficiently distinct, nor have I yet met with any puzzlingly intermediate forms between them. Both grow commonly on the hard stems of the *Cymodocea*, but while the present is found along the whole western and southern coasts, the former is very local, and by me only met with at Cape Riche.

The genus *Dicranema*, placed by Agardh among *Sphærococcoideæ*, appears to me to range better with the *Gelidiaceæ*, both because the placentæ are parietal, and derived from the medullary filaments, and because the nucleus is composed of pedicellate, *single* spores, not forming moniliform series. To me the *cystocarp* appears like that of a *Hypnea*, condensed; differing in the more columnar form of the placenta, and, consequently, the more closely-placed spores. The substance of the frond, too, is of the rigid, half-horny character of the *Gelidia*, and the dichotomous ramification, though unusual in *Gelidiaceæ*, occurs in a species of *Gelidium* itself.

Fig. 1. DICRANEMA GREVILLEI,—*the natural size*. 2. Tips with imbedded conceptacles. 3. Section of a conceptacle. 4. Spores from the same. 5. Tips with *tetraspores* in the dilated extremities. 6. Cross section, showing the tetraspores *in situ*. 7. Tetraspores removed:—the latter figures variously *magnified*.